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VOLUME 7

1957

*Cooperative*  
**ECONOMIC INSECT  
REPORT**

**INSECTS NOT KNOWN  
TO OCCUR IN THE UNITED STATES**

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*Issued by*

**PLANT PEST CONTROL DIVISION**

**AGRICULTURAL RESEARCH SERVICE**

**UNITED STATES DEPARTMENT OF AGRICULTURE**



# **AGRICULTURAL RESEARCH SERVICE**

## **PLANT PEST CONTROL DIVISION**

### **PLANT PEST SURVEY SECTION**

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearing house and does not assume responsibility for accuracy of the material.

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Plant Pest Survey Section  
Plant Pest Control Division  
Agricultural Research Service  
United States Department of Agriculture  
Washington 25, D. C.

## INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

(1-36 of Series)

\*\*\*\*\*

This series was initiated early in 1957 as an aid in strengthening the detection program against foreign insect pests not known to be established in this country. The compilations have been released individually in the Cooperative Economic Insect Report (Volume 7) but due to requests for complete sets of the series, the separates are being assembled under one cover. The compilations will continue to appear periodically in the Report. Preparation of this material has been made possible through the generous cooperation of Plant Quarantine and Entomology Research Divisions, ARS, and the U.S. National Museum.

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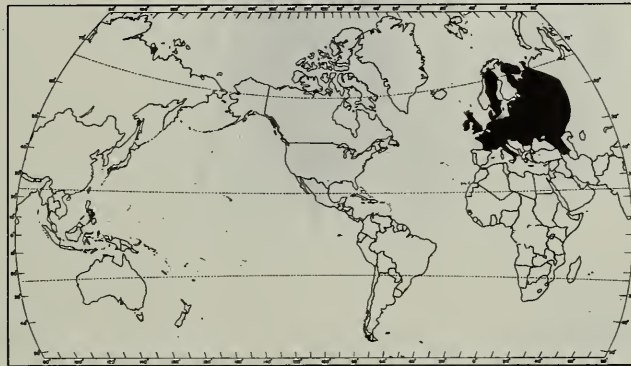


INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

A Chafer (Melolontha melolontha (L.))

Economic Importance: This scarabaeid is a major pest in Europe. Serious damage from both larvae and adults has been recorded in Czechoslovakia and severe losses have been observed on beets and cereals in Denmark. An outbreak in British Isles in 1932 was serious on strawberry, young fruit trees, vegetables and cereals. In some cases losses were estimated at over 100 pounds sterling per acre. Larvae caused up to 65 percent loss of peas and beans on several farms in that country in 1937. In Rumania this beetle has caused considerable injury in vineyards.

Distribution: British Isles, Austria, Denmark, France, Germany, Holland, Hungary, Italy, USSR, Poland, Sweden, Rumania, Switzerland, Czechoslovakia.



General Distribution of Melolontha melolontha

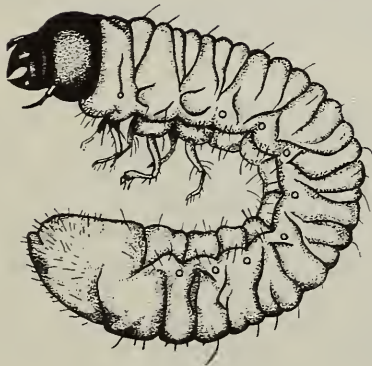
Hosts: This chafer has been recorded on over 60 hosts including fruits: strawberry, grape, apple, pear, plumcherry; vegetables: peas, beans, onion, lettuce, potato, crucifers; field crops: oats, barley, maize, soybean, tobacco, alfalfa, clover; and many ornamentals and trees. Larvae attack roots of almost any plant and adults damage leaves of fruit, ornamentals, forest and shade trees.

Life History: Under conditions in the British Isles the life history of this species is as follows: Adults usually appear during first warm weather in May and are on wing until early in July. They fly mostly in the evenings and are not conspicuous at any time during the period. Adults feed on leaves of a variety of trees and shrubs, especially oak, beech, elm, birch, apple and hawthorn but cause no important damage. Mating occurs on trees and the female burrows into the soil to oviposit at depths of 3-15 inches. About 24 eggs are laid together and this group may be followed by a second batch after the female feeds above ground for about two additional weeks. The eggs hatch in about six or seven weeks and the small larvae begin feeding on fine roots of grasses, young trees and other plants. In late September they move down to levels of 12 to 30 inches and remain inactive until spring when they ascend to upper levels of the soil and resume feeding. Pupation occurs in the third year but adults do not emerge until the following spring thus four years are required for a life cycle. Numbers of adults vary from year to year but there is usually a "flight year" once in four when the chafers are much more abundant.

Description: The adult is about an inch long with black head and thorax and reddish-brown elytra. Club-shaped end segments of antennae have seven leaves in male and six in female. The club of the antenna is much longer in the male. The milky white, fleshy, curved and wrinkled larva is one and one-half inches long when full grown. The species may be identified by number and arrangement of spines on the ventral surface of the last body segment (see illustration). These spines form two rows, 25 to 30 in each row, near the middle of the segment. The pupa has the general appearance of an adult but is orange-yellow in color. It is about one and one-eighth inches in length. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(2) 1-11-57



Adult (slightly  
over natural size)



Larva (about two times  
natural size)

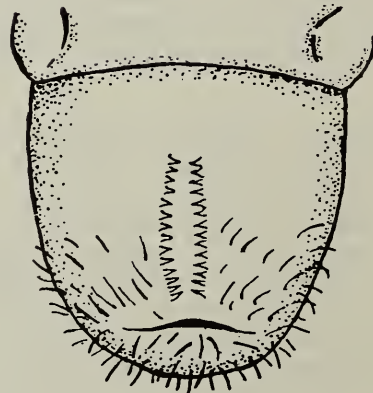


Diagram of ventral  
Surface of Hind Segment

Figure of adult from H. M. Forest. Comm. Leaf. 17. Figure of larva and hind segment from "Insects of the British Woodlands," R. Neil Chrystal.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

CUCURBIT BEETLE\* (Diabrotica speciosa Germ.)

Economic Importance: Adults of this chrysomelid feed on foliage, flowers and fruits of many plants. The larvae are pests on roots, especially corn and peanuts. It is the most harmful species of Diabrotica in Argentina and causes much damage to watermelon, squash and tomatoes in Brazil. Young squash plantings and immature tomato fruits are severely damaged in the latter country. Populations are so heavy in some years in Paraguay that vegetable crops are almost completely destroyed. Severe injury also occurs on flowers of various ornamentals such as dahlias and chrysanthemums. D. speciosa has been intercepted at United States port of entry on several occasions.



Damage to Corn  
Seedling



Damage to Melon  
Leaves and Flowers

Distribution: Reported from Argentina, Brazil, Uruguay, Paraguay, Colombia, Bolivia, Costa Rica, Panama, Peru and Venezuela.



General Distribution of Cucurbit Beetle

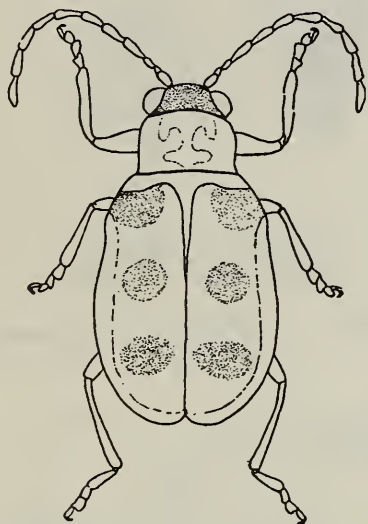
\* Also called chrysanthemum beetle and San Antonio beetle

(Chrysomelidae, Coleoptera).

Hosts: General feeder. More important hosts include cucurbits, corn, sorghum, beets, crucifers, peas, beans, cotton, potato, tomato, apple, peach, citrus.

Life History and Habits: The insect overwinters as an adult, emerging on warm spring days. Oviposition begins soon after emergence. Eggs hatch in about 10 days. The larvae bore into and feed on roots. Pupation occurs in the soil. The adults feed on leaves, flowers, and fruits of many plants, especially composites. Number of generations a year varies, but in the Buenos Aires area, observations indicate there are about three.

Description: Adults oval, 5-7 mm. long, similar to D. balteata. Dorsum generally bright grass-green with 6 large yellow-green or ochreous spots on the elytra with humeral areas reddish-brown. Head reddish-brown, eyes black. Ventral surface yellow-green. Tibia and tarsi dark colored, remainder of legs yellow or brownish. Egg clear yellow. Larvae 1.5 mm. on hatching. whitish with dirty yellow head. Fully grown larvae measure 10-15 mm. CEIR 7 (52) 12-27-57



Adult of D. speciosa



Anal Plate of Larva

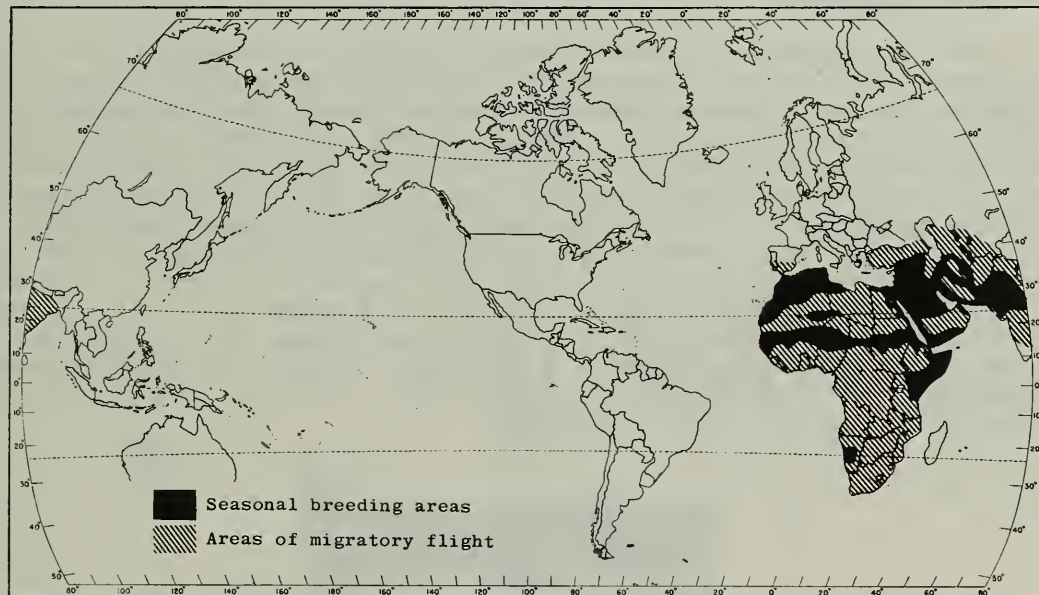
Figures (except map) from Christensen, Jr. R. 1943. Rev. Facul. de Agron. y Vet. (Buenos Aires) 10(3): 464-516.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

DESERT LOCUST (*Schistocerca gregaria* (Forsk.)

Economic Importance: Plagues of this locust have been known throughout the Middle East and Africa since early Biblical times. Damage has been extensive in many areas although the frequency of attacks is largely dependant on ecological and meteorological conditions. Normally attacks occur only about once in 10 years in Egypt. Losses on sorghum caused by the migratory phase in the Sudan in 1936 were estimated at 50,000 tons and an estimated 1,235,000 acres of crops in French North Africa, valued at 100 million francs, were destroyed in 1929 and 1930. Swarms were very numerous in Iran and India during 1951 and 1952 and in the latter country the swarms covered over 100 square miles with one egg field extending over 150 square miles. Costs of the control campaign in 1954 and 1955 amounted to about 1,300,000 dollars and the campaign in 1955 and 1956 to about 1,500,000 dollars.

Hosts: Attacks many cultivated and wild hosts, the most important being alfalfa, tobacco, sorghum, millet, beans, sugarcane, cotton, citrus and small grains.



General Distribution of Desert Locust

Distribution: The migratory forms invade large areas covering most of Africa and the Middle East. Generally, limits of migrations are east to the Bay of Bengal in India, as far north as the Aral Sea in USSR and southern Spain in Europe, although isolated specimens have been collected as far north as Scotland. The species has also been reported in Zanzibar, Canary Islands and the Azores.

Life History and Habits: Average life of adult male is about 80 days, adult female about 68 days in Egypt. Oviposition takes place in cultivated and desert areas, preferably in sandy soil. Breeding rarely occurs south of latitude 12° north. Females deposit from 1 to 6 egg pods with number of eggs per pod averaging between 28 and 59. The incubation period requires 27 to 43 days in February and March and 15 days in April and May. Young locusts in the migratory phase display gregarious instincts from the beginning and march in column, not in line. The nymphal stages require about 45 days in winter. There are normally 5 instars, sometimes more. As they advance in age, nymphs become more voracious. The desert



locust exists in two extreme forms or phases, one typically swarming (phase gregaria) and the other typically solitary (phase solitaria). The intermediate phase or form is transiens. The difference between the two phases lies in the habits and morphological characteristics of the adults and the color and habits of the nymphs. Under favorable conditions 3 generations a year may be produced. There is no diapause in any stage of development. Invasions of migratory locusts are always characterized by irregular fluctuations rather than a regular periodicity. The morphological distinctions between the two phases are noted in the description. The migratory phase exhibits the characteristics of the phase when and where the density of the populations makes it possible. The grasshoppers living in isolation cannot retain these characters and acquire those of the solitary phase. This transforation is not immediate, but may extend over one or more generations, hence intermediate forms are common. Young swarms of migratory forms leave the breeding areas in East Africa in October and breed during winter rains on the coasts of the Red Sea. Grasshoppers from this brood later migrate inland where another generation is produced. This brood returns to breeding grounds in East Africa for the summer rains. The same general pattern is true in western North Africa. The insects breed during winter and spring in Algeria, Tunisia and Morocco and then migrate to Sudan, French West and Equatorial Africa for the summer rains. Breeding during the summer rains also takes place in north-western India and Pakistan.

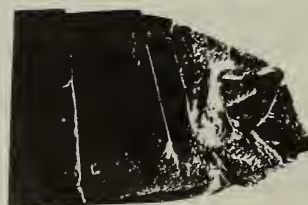
Description: The differences between phase gregaria and solitaria are as follows. The gregaria form - recently molted adults pale-pink gradually changing into red when in migration flight. Sexually mature males bright yellow while females slightly yellow, especially on head, thorax, basal part of elytra and legs; abdomen slate. Pronotal keel less distinct and surface of pronotum almost smooth. Earlier stages black, gradually changing into black with orange, red and yellow combination. Nymphs exhibit gregarious habit from beginning and form dense bands which move in masses. The solitaria form - recently molted adults greenish and later becoming grayish. Sexual maturity attained without any change in color. Pronotal keel more developed. Pronotum more distinctly sculptured. Nymphs uniformly green, with faint traces of black markings, rarely fawn or dark waxy green. Nymphs generally not gregarious, even when they exhibit a tendency towards gregariousness they do not move in masses. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7 (51) 12-20-57



Adult of Schistocerca gregaria



Posterior of Male



Posterior of Female

Figures of posterior end of abdomen of male and female from Faure, J. C. 1932. Bul. Ent. Res. 23(3):293-405. Figure of adult--USDA photograph.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

GARDEN CHAFER (Phyllopertha horticola (L.))

Economic Importance: This chafer is a rather general feeder, both larva and adult, on many economic plants. It is of major importance in forest nurseries in the British Isles where the larvae severely damage roots of seedlings. Such damage is also reported on young apple seedlings in southern Czechoslovakia. Serious infestations occurred on grasslands in southern and central Wales between 1935 and 1943. The pest also causes injury to small grains. Rye is damaged considerably in Denmark in some years. The adults feed on the foliage of many plants and are particularly destructive to leaves of fruit trees and occasionally to the young fruit.

Distribution: From Britain through central and northern Europe, Russia, Siberia and Tibet.

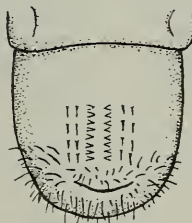
Hosts: Among the many hosts of P. horticola are small grains and grasses, rosaceous fruits, beets, crucifers, beans, peas, flax and forest trees.

Life History and Habits: In the English Lake District, the life history of this insect is as follows: Adults appear generally the last week of May, the males one week before the females. Oviposition occurs in the surface of the soil, each egg being placed in an earthen cavity. Incubation averages five weeks. There are three larval instars with the third ending in diapause. Prepupation begins near the end of March and lasts for three or four weeks; pupation begins third week of April and lasts about four weeks. There is only one generation at a time in the soil and the life cycle requires 12 months. The larva feeds on plant roots which it obtains by tunnelling through the soil. The species frequents grassland mainly, especially in wooded areas.

Description: Adults about 13 mm. long. Wings shiny red-brown, thorax metallic blue or green, under-surface hairy. Larva is about 20 mm. long and to the unaided eye resembles the Japanese beetle grub very closely. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(22) 5-31-57



Damage to Beech Seedlings  
by Chafer Larvae



A



B

(A) Diagram of ventral surface of hind segments of larva.  
(B) Adult (slightly enlarged).

Figures reproduced from H. M. For. Comm. Leaflet 17, 1946

Scarabaeidae, Coleoptera



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

A LEAF-CUTTING ANT (Atta sexdens (L.))

Economic Importance: The Atta leaf-cutting ants, of which A. sexdens is the chief economic species, are reported to be the most destructive insects in Brazil and elsewhere in Latin America. In Brazil, A. sexdens is responsible for large losses on crops, particularly cotton, citrus, eucalyptus and rose. Much farm land has been abandoned where control failed or was not applied. Citrus and avocado trees have been defoliated overnight in Peru. The pest is also seriously destructive to ornamental shrubs and trees in the Canal Zone and other areas. Damage to plants occurs through removal of succulent parts which are used in construction of fungus beds. The ant subsists entirely on fungi. The mounds may extend over an area covering as much as 14,000 square yards.

Distribution: Argentina, Brazil, British Guiana, Canal Zone, Colombia, Costa Rica, Dutch Guiana, Ecuador, Guatemala, Panama, Peru, Uruguay and Venezuela.



General Distribution of Atta sexdens

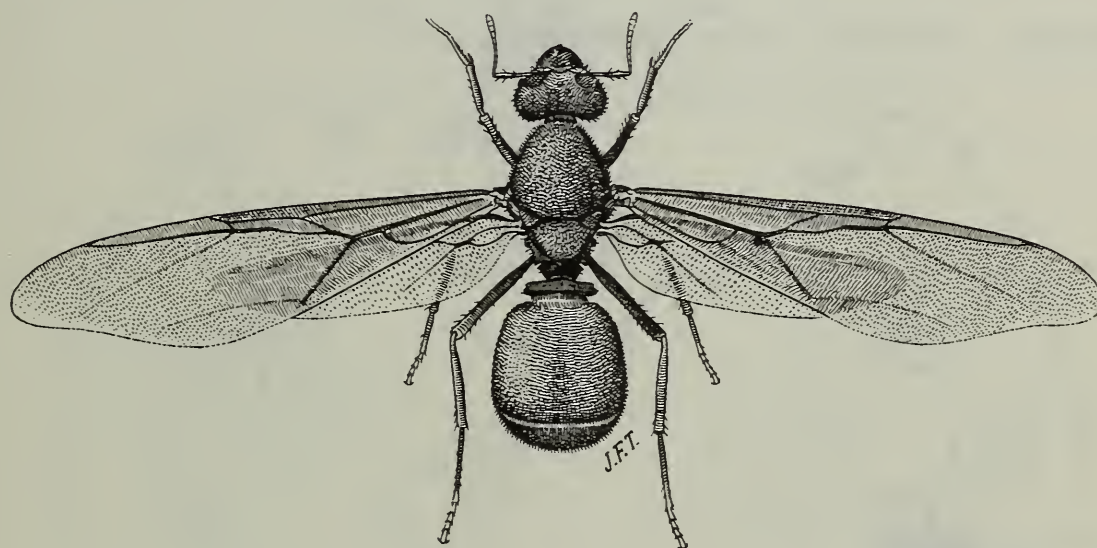
Plants Attacked: Defoliates many plants including citrus, cotton, rose, apple, avocado, cacao, ornamental shrubs and trees as well as wheat, rice and other grasses. Grains in storage are sometimes carried into nests.

Life History and Habits: Ants of this genus, after mating, drop to the ground and the male dies. The queen loses her wings and begins a new colony, usually in cultivated soil. The first eggs are deposited in the enlarged end of a 6-8 inch gallery. A small portion of fungus brought from the old nest is deposited with the eggs. The contents of these eggs, which the queen breaks and mixes with fecal matter, serve as a medium for the growing fungus. Later, more eggs are laid and the first castes attend the fungus. Other castes soon appear and begin further excavation. Finally, foraging ants, those responsible for

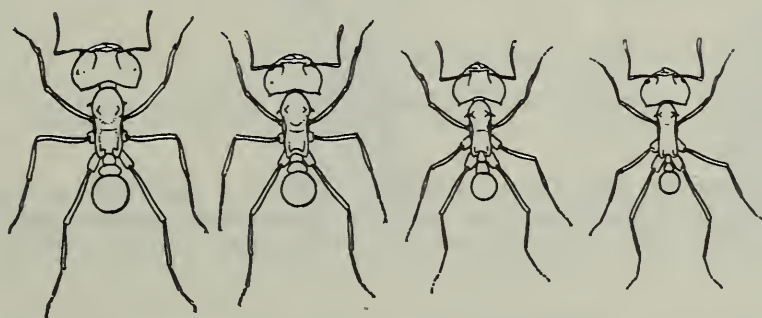


gathering plant material for the fungus substrate, appear in the colony. As the colony grows the ants build larger fungus gardens. Large nests may contain as many as a thousand chambers. The nests begin with one opening but later there may be numbers, some of which are several hundred yards removed from the original. Under Brazilian conditions, incubation requires 14-40 days, larval period 12-15 days or longer and pupal 2-3 weeks. Queens may live for 12 years.

Description: Size of workers range from 1.5 - 12 mm. Largest workers with major part pilose. At least two lateral frontal areas without erect hairs. Pro- and mesopleura almost without sutures, with a fine delicate reticulation. Body unicolor, clear light castaneous color, reddish castaneous or reddish brown; the gaster sometimes a little darker. Anterior mesonotal spines conical and thick about same length as those of epinotum which are spiniform, elongate and directed upward. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(32) 8-9-57.



Queen of Atta sp. (enlarged)



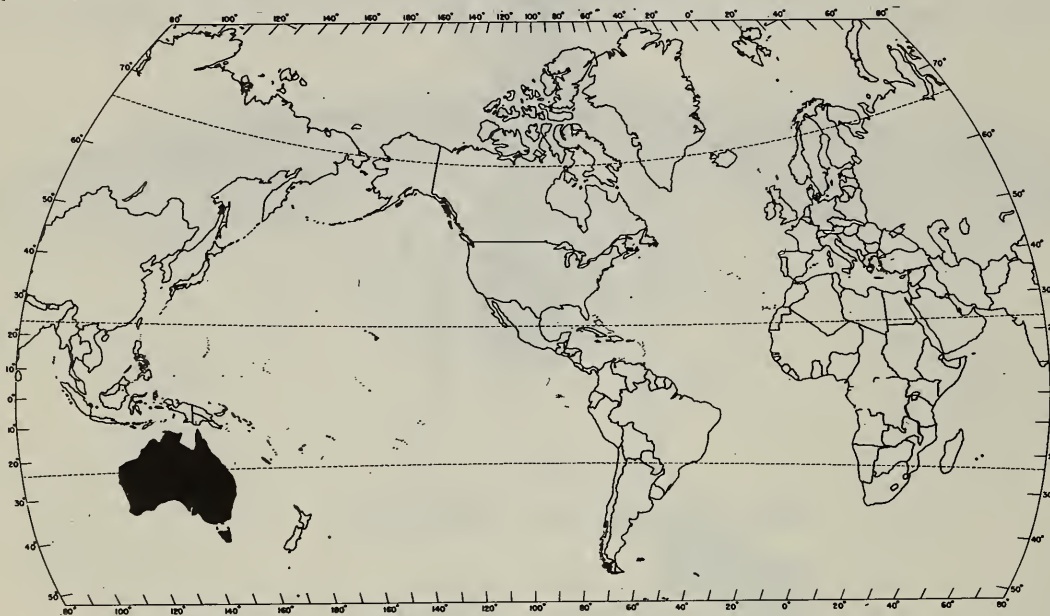
Workers (enlarged)

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

RUTHERGLEN BUG (Nysius vinitor Bergroth)

Economic Importance: This lygaeid is considered one of the worst native pests of southern Australia. In outbreaks it may be as injurious as the North American chinch bug and its host preference is much greater. N. vinitor feeds on many succulent plants causing damage to such crops as tomatoes, onions, wheat, cotton and fruits. Observations show that one heavily-infested apricot orchard yielded only 100 boxes of fruit compared with 3,000 boxes the following year when the insect was properly controlled. Damaging infestations usually occur in hot dry weather following rains although the pest appears in vast numbers only about once in 10 years.

Distribution: Australia including Tasmania.



General Distribution of Nysius vinitor

Hosts: Wide host range including wheat, cotton, vegetables and fruits. On vegetables it is most important on beans, tomatoes, beets and potatoes. Although fruits, including citrus, are generally attacked, stone fruits are most susceptible.

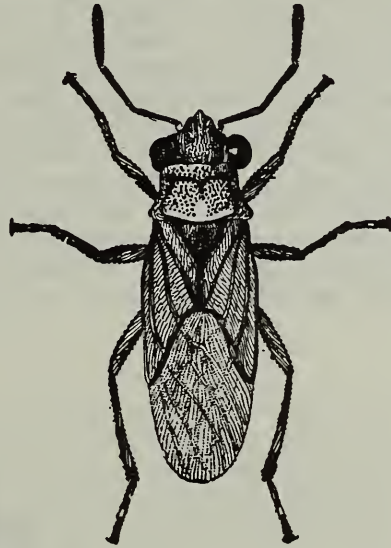
Life History and Habits: Overwintering adults commence breeding in early spring and lay eggs in the soil, in the glumes of grasses and in flower heads of weeds, particularly composites. The adults are active when disturbed in warmer periods and resemble flies in their movements. The eggs, placed in compact groups of 2 to 7, hatch in about 6 days. More than 400 eggs can be laid by a single female. Nymphs mature in about three weeks passing through five molts. The young insects do not migrate far from the food plants, but the adults will fly considerable distances. The life cycle requires about four weeks.

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Lygaeidae, Hemiptera



Description: Adult is about 5 mm. long, narrow-bodied and generally grayish-brown, with darker brown markings. Eyes are black and prominent and two small ocelli are visible on the top of the head. Antennae are four-segmented. Eggs are about 1 mm. long, creamy-white at first but becoming reddish-brown before hatching. The nymphs are generally reddish-brown. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(40) 10-4-57



Adult



Nymphal Stages (first, third and fifth instars)

Figures of instars from Veitch, R. and Simmonds, J. H. 1929. Pests and Diseases of Queensland Fruits and Vegetables. 198 pp. Brisbane.

Figure of adult from New South Wales Dept. Agr., Ent. Br., Div. Sci. Serv. Insect Pest Leaf. No. 6, Rev. 1952, 2 pp.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

TOBACCO AND TOMATO CATERPILLAR OR EGYPTIAN COTTONWORM (Prodenia litura F.)

Economic Importance: This general feeding phalaenid is important on several crops throughout the tropical and subtropical climates where it occurs. Severe outbreaks cause widespread defoliation of leafy plants. The species is a serious pest of cotton in Egypt where in some years its ravages are so extensive that many fields lose more than three-quarters of the yield. On this crop, leaves are principally attacked but flower buds and green bolls may also be fed upon. Damage may be so severe that the plants are reduced to bare stalks. In 1938 the cotton crop in Egypt was reduced by around half a million bales by P. litura. The insect is recorded as a major pest of tobacco in Japan, Philippines, Indonesia (Sumatra), Indochina and Australia. Leaf injury to tobacco in Sumatra in 1918 on 80 estates amounted to 33 percent. It is considered a serious pest of mulberry in Formosa and tomatoes in several countries and damages rice in the Philippines annually.



Cotton Leaves, Square and Boll Damage

Figures from I. Bishara. Ministry of Agriculture, Egypt, Leaf. 31 (n.s.) 16 pp. 1936.

Phalaenidae, Lepidoptera

Distribution: Recorded throughout Africa, most of Asia including Israel, India, Burma, Ceylon, Thailand, China, Japan and Korea. Distributed southward to Australia, and through most of the Indian Ocean and South Pacific Ocean regions but not in Hawaii. In Europe it is recorded in Greece and Spain.

Hosts: A general feeder but most commonly known as a pest of cotton, tobacco, tomatoes and corn. Other hosts include various grasses, legumes, crucifers, beets, potatoes, citrus and ornamental plants.

Life History and Habits: The eggs are laid in groups of 100 to 300 on underside of a lower leaf. One female may deposit as many as 1,500 to 2,000 eggs. In Egypt, eggs mature in 3 to 4 days. Larvae mature in 2 or 3 weeks, drop to soil and make earthen cells in which to pupate. After 7 to 10 days moths emerge. There are 7 generations a year in Egypt with two main generations (June-August) on cotton. In winter and spring the insect is found chiefly in berseem but in small numbers. On tobacco in Australia first and second-instar larvae crowd in vast numbers on one or two leaves but older larvae are more solitary and range over the plant. Generally, the insect will breed continuously throughout the year where climate permits.

Description: Adult - Expanse 30-44 mm. Head and thorax whitish mostly suffused with pale red. Abdomen ochreous tinged with pale red. Forewing ochreous mostly suffused with brown; marked with white. Hindwing white with apex slightly tinged with brown. Resembles adult of yellow-striped armyworm (*P. ornithogalli*) except that *litura* female has darker hind wing. The eggs are laid in groups, each covered with light brown hairs shed by the female during oviposition. The young larvae are pale green, but the first abdominal segment is suffused with black pigment. In late instars the larva is dirty brown with black triangular blotches on the side of each body segment. The rows of these wedge-shaped markings on either side of the body are useful for diagnostic purposes. The pupa is reddish brown inside a rough earthen case. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(20) 5-17-57



Larva enlarged



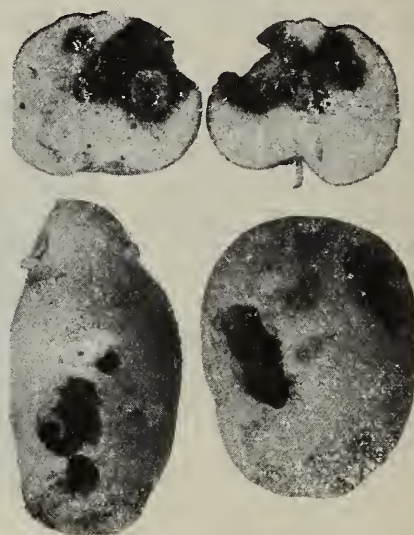
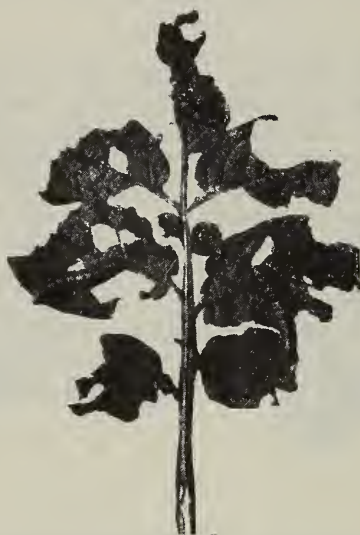
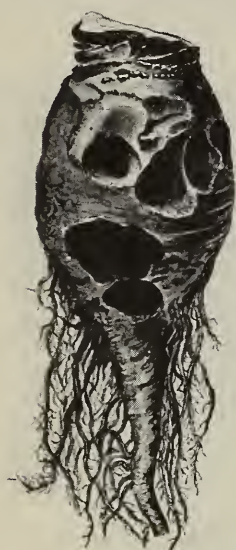
Adult



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

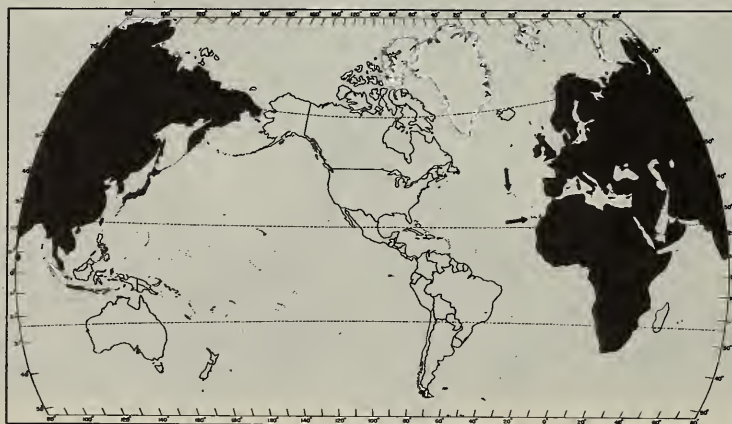
TURNIP MOTH (Agrotis segetum (Denis and Schiffermuller))

Economic Importance: This cutworm is a voracious feeder on many wild and cultivated plants in Europe, Asia and Africa. Young nursery stock, field and vegetable crops are often destroyed in a few days during outbreaks. According to reports, the pest appeared in such devastating numbers in the agricultural regions of Russia in 1839 that the resultant crop loss and food shortage caused rioting in several areas. Many other outbreaks have occurred in that country on such crops as grains, sugar beets and cotton with those of 1909 and 1924 causing loss of almost 500,000 acres. Czechoslovakia had severe damage to potatoes and other crops in 1921 and from 80-100 percent loss on beets in some districts in 1931. Widespread damage to beets and potatoes occurs periodically in Germany, Britain and Poland. A. segetum is also an important pest of corn and tobacco in Africa and one of the major pests of green crops in India.



Damage to Turnip, Potato Foliage and Tubers

Distribution: Africa, Asia and Europe. Also the Azores.



General Distribution of Agrotis segetum



Hosts: General feeder. Among more important hosts are grains, crucifers, beets, cotton, potatoes, sweetpotatoes, tobacco, melons and grapes.

Life History and Habits: Under conditions in Germany, adults become active in mid-May with most of the oviposition occurring in the first half of June. Eggs are laid in batches of 600-700 on stems and lower leaf surfaces of low-growing plants. Larvae hatch in 8-14 days, feed until end of September and hibernate in tunnels in the soil. Pupation occurs in the spring with no resumption of feeding. There is generally one generation a year in the Berlin area; however, two generation are reported from Czechoslovakia and four from Southern Rhodesia. Larvae in third and subsequent instars are not found on plants during daytime but under debris or in the soil surface.

Description: Adult forewings yellowish-gray or brownish-gray; expanse about 40 mm. Transverse lines double and dentated but often indistinct. Stigmata dusky surrounded by blackish. Hindwings white with brownish veins. Antennae of male pectinate, female filiform. Larva is clay-colored with three dark lines on back, middle line double; ventral surface dull white; 40-50 mm. long at maturity. Pupa is brownish-red. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(41) 10-11-57



Adult



Larvae

Figures of damage to potatoes from Frickhinger, H. W. 1955. Leitfaden der Schadlingsbekämpfung. 505 pp. Stuttgart.

Figures of adult, larvae and damage to turnip from Rostrup, S. and Thomsen, M. 1931. Die Tierischen Schadlinge des Ackerbaues. 367 pp. Berlin.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

YELLOW PEACH MOTH\* (Dichocrocis punctiferalis Guen.)

Economic Importance: This pyraustid is one of the most destructive pests of peaches in China and cotton in Australia where it causes serious injury to the bolls. Boll infestations of 27 percent are reported from Queensland. Corn, grain sorghum, peaches, bananas, papaya and other fruits are damaged also in Australia. Larval feeding on heads of grain sorghum is sometimes responsible for almost complete loss of crop in coastal areas of the country. In southern India and Ceylon D. punctiferalis is a serious pest of castorbean and fruit, though more important on castorbean causing loss of seed capsules and terminals. It is also apparently of some significance on pine in Japan as it is occasionally intercepted at ports of entry on Pinus spp. from that country.

Distribution: Southern and eastern Asia including India, Ceylon, Burma, Malaya, China, Formosa, Japan and Korea; Australia; Indonesia and New Guinea.



General Distribution of Dichocrocis punctiferalis

Pyraustidae, Lepidoptera

\*Also called spotted maize moth in Australia and castor seed caterpillar in India.



**Hosts:** General feeder on foliage and fruits of many plants, though typically a pod borer. Among hosts are fruits (including citrus), castorbean, soybean, corn, sorghum, cotton, chestnut, pine and teak.

**Life History and Habits:** This pest breeds throughout the year in India and parts of Australia. The small, oval eggs are laid on or near fruit or seeds of hosts. Larvae feed on or in seed, seed capsules or young shoots. In Australia the larvae mature in approximately 3 weeks in summer and pupation lasts for 2 to 3 weeks; however in winter pupation may be prolonged to eight weeks or more. In severe attacks on sorghum in Australia, plant heads touching each other are bound together in a tight mass of webbing. The pest also bores into and tunnels the stalk, although this type of damage is less common in grain sorghum than in corn.

**Description:** The adult is conspicuous having orange wings with numerous black spots and a wing expanse of approximately 25 mm. Full-grown larva is 15 to 25 mm. long, rather stout, pale or reddish brown with numerous flattened horny warts from which arise short bristly hairs; head red-brown, prothoracic shield large. The pupa is brown and about 11 mm. long and is enclosed by a white silken cocoon. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)

CEIR 7(34) 8-23-57



D. punctiferalis Moth, Pupa and Larva (enlarged)

Figures, except map, by W. Manley. Queensland Agr. Jour. 61(4):225. 1945.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

ASIATIC RICE BORER (Chilo suppressalis (Walker))

Economic Importance: This crambid borer is a serious pest of rice in the Orient and causes heavy damage to corn, sorghum and sugarcane in India, Iraq and Egypt. In northern areas of Indochina, China, Formosa and Japan, the insect is responsible for annual damage of 5 to 10 percent of rice crop with local damage up to 60 percent. Damage to rice was so heavy for several years in Hawaii that the crop became unprofitable and much of the land was abandoned. Likewise, cultivation of corn was discontinued in the Mesopotamia area of Iraq in 1918 following severe infestations in that region. Loss from Asiatic rice borer often parallels that of durra stem borer (Sesamia cretica) in Egypt. Serious injury occurred on rice in Spain in 1935 although the species was not known from that country until 1933. Severely infested rice has a high percentage of dead shoots and leaves and fails to set grain. All parts of sugarcane, sorghum and corn plants are attacked except the roots. Chilo suppressalis is frequently found in rice straw from Japan at United States ports of entry.



Asiatic Rice Borer Damage

Distribution: Occurs throughout most of Asia including China, Japan, U.S.S.R., Malaya, Formosa, Philippines, Indonesia (Java), Indochina, Burma, India, Ceylon and Iraq. Also recorded in Egypt, Nyasaland, Zanzibar, Spain, Portugal and Hawaii.



General Distribution of Chilo suppressalis

**Hosts:** Major hosts are rice, sorghum, sugarcane, corn and millet. Many other wild and cultivated grasses are attacked.

**Life History and Habits:** The life history on rice is quite variable according to ecological conditions. The number of generations varies from 1 per year in northern Japan and Manchuria to as many as 5 per year in central and southwest China. Two generations a year are most common in temperate climates. Adults of the overwintered generation appear when the temperature is in the mid-60's and continue to emerge over a considerable period, flying at dusk or at night. In Japan adults usually emerge the second half of June. Rice seedlings are planted in the fields at this time and are often severely damaged. Eggs are laid on underside of leaves, usually over 100 per cluster. In Spain, at average temperatures of about 80°F. the eggs hatch in 5-6 days and the larvae pupate within 30-40 days with pupation lasting about a week in summer and between 10-20 days in the spring. Larvae mature before hibernation and overwintering occurs in the stalks of hosts.

**Description:** Eggs oval, flattened, about 1 mm. in length, creamy white when first laid and are deposited in two rows that overlap as a rule. Near hatching they change to orange with a black spot in the middle. Newly-emerged larva is orange with black head and about 2 mm. in length. Mature larva is 25 mm. long with black or dark brown head and dirty white body. There is a conspicuous dark patch behind head, and generally 2 dark longitudinal lines on each side. On each segment there are small spines set on dark spots. Color is extremely variable; hibernating larvae frequently lack spots and the spines are same color as skin. Pupa brown, male smaller than female. Male forewings straw-colored, wholly suffused with light brown, with minute, brown to rather dark specks dispersed irregularly all over and sometimes forming small patches; terminal series of spots dark brown to piceous; fringe not very shiny, of lighter color distally. Hindwings whitish, with a shade of brown near the costa and apex; ridge on the underside. Labial palpi a little over twice the length of the head. Female forewings usually paler with fewer dark specks and hindwing uniformly whitish. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)

CEIR 7 (44) 11-1-57



Larvae, Pupa and Adult of Chilo suppressalis

**Figures (except map):** Larvae and pupa from Fletcher, T. B. and Ghosh, C. C. 1919. Report of the Proceedings of the Third Entomological Meeting, Pusa. Vol. 1; 354-417. Adult and damage from Gomez Clemente, F. 1940. Bol de Path. Vegetal y Ent. Agr. 9:51-66.



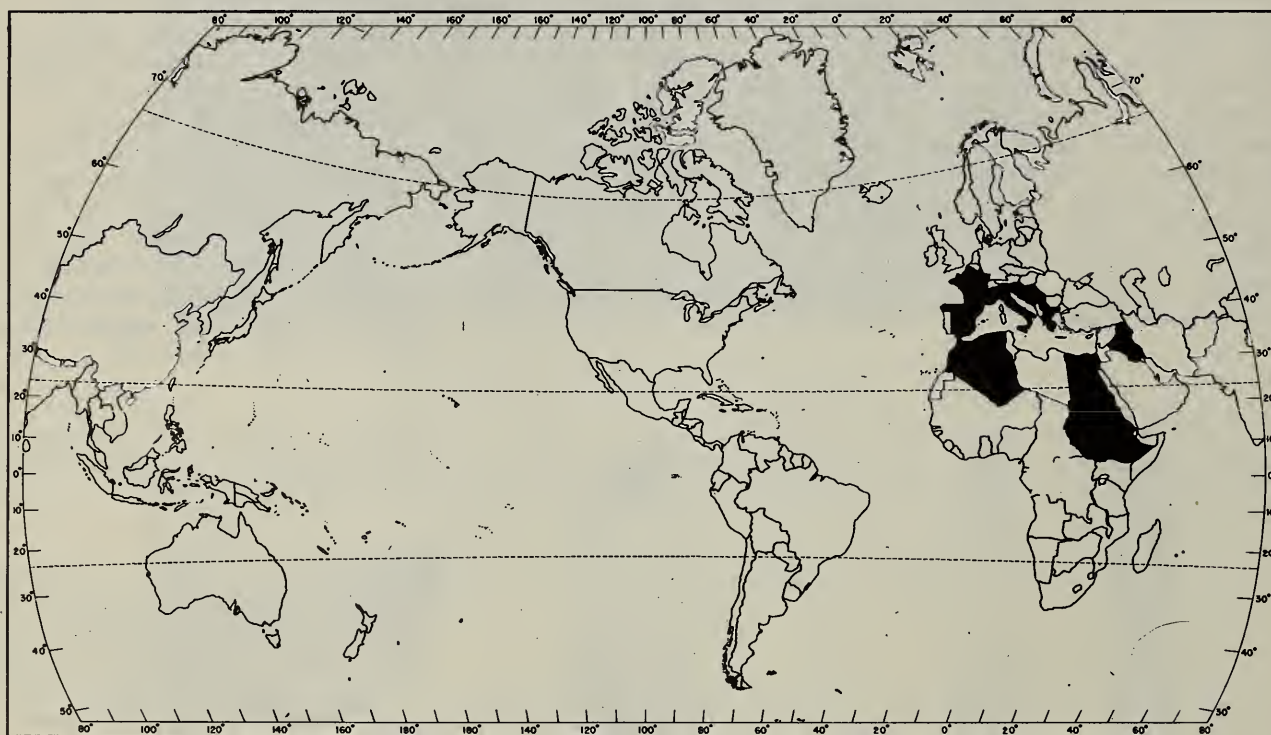
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

DURRA STALK BORER (Sesamia cretica Led.)

Economic Importance: This phalaenid is considered an important pest of corn, broomcorn and sorghum in the Mediterranean area. Infestations as high as 90 percent have been reported in southern Italy. Attacked plants are weakened thereby reducing yield of seed. The sugar content of cane is also reduced. In the province of Trieste, S. cretica is regarded as more important on maize than the European corn borer. This pest is frequently intercepted at U. S. ports of entry in broomcorn from Italy, thus necessitating mandatory fumigation as a condition of entry.

Hosts: Corn, broomcorn, sorghum, sugarcane and other grasses.

Distribution: Algeria, Sudan, Egypt, Ethiopia, France, Greece, Italy, Iraq, Morocco, Spain and Yugoslavia.

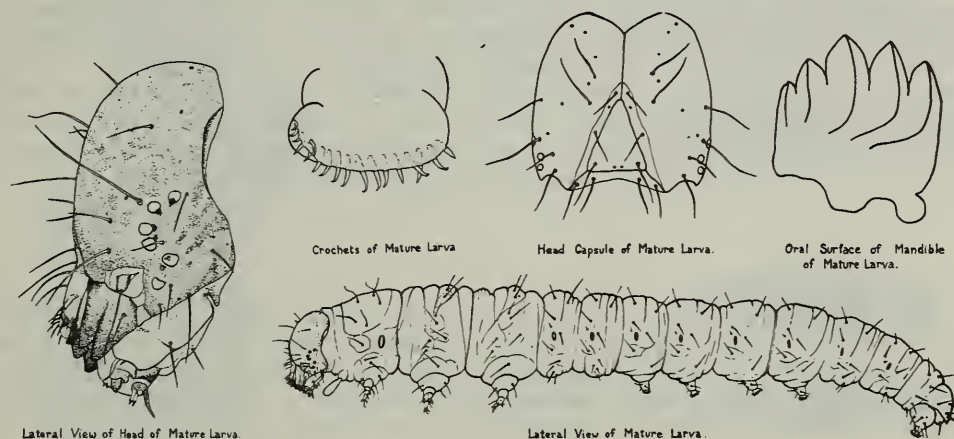


General Distribution of Durra Stalk Borer

Life History: Observations on the biology of this species in Italy indicate it hibernates as a mature or nearly-mature larva in stalks of sorghum, broomcorn or corn. Adult emergence occurs in April and May. Eggs are deposited singly on leaves or in small batches, about 26 eggs per cluster under the leaf sheaths. On hatching, the larvae feed at first on the leaves than bore into the stalks or attack the ears. Pupation occurs usually in the stalks. Two generations a year are reported in Italy.



Description: The wing expanse of the moth ranges from 30 to 42 mm. Although coloring varies, a common form has pale yellowish-brown forewings, head and thorax. Many specimens have dark markings in center of the forewing. The hindwings are white becoming yellowish outwardly. This species, especially those forms having black markings in the forewing, resembles the American *Leucania* spp., but the wings are shorter and broader and the eyes are not haired as in *Leucania*. Newly-deposited egg masses are pale yellow but change to pink as incubation proceeds. The larva develop through 6 instars, measuring from 14-20 mm. in length after the sixth molt. At this stage the head is chestnut brown, the back pink and the lower parts yellowish. The reddish-brown pupa is 15-20 mm. in length. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(7) 2-15-57



Sesamia cretica larva greatly enlarged (after Berg)



Sesamia cretica Adults

Drawing of larva by G. H. Berg. Adults - USDA photographs.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

MAIZE STALK BORER (Busseola fusca Fuller)

Economic Importance: This phalaenid is one of the best known stem borers of Africa, having been recognized as a major pest of corn and sorghum since it was described over 50 years ago. It is considered the most serious insect pest of corn in South Africa causing annual losses estimated at 10 percent or about 1,000,000 pounds sterling. Fifty percent or more of the young plants are destroyed in outbreak years in this area. A regular loss of five percent of the crop occurs in Tanganyika. In Kenya, where B. fusca causes as much as 85 percent of insect damage to corn, the pest is considered sufficiently serious to warrant legislative control of corn growing. Destruction of as much as 90 percent of corn plants has been recorded in highland areas of Nyasaland.

Distribution: An African moth, apparently from the tropical and sub-tropical parts of the continent originally, but now widespread in the corn areas south of the Sahara. Known to occur in Union of South Africa, Rhodesia, Uganda, Tanganyika, Kenya, Belgian Congo, Nyasaland, Nigeria, Ethiopia, Sierra Leone, Zanzibar, Angola, French Guinea, Ghana and Cameroons.

Hosts: Corn, sorghums, millet, Johnsongrass, napiergrass, broomcorn, pearl millet, sugarcane, barnyardgrass and teosinte.

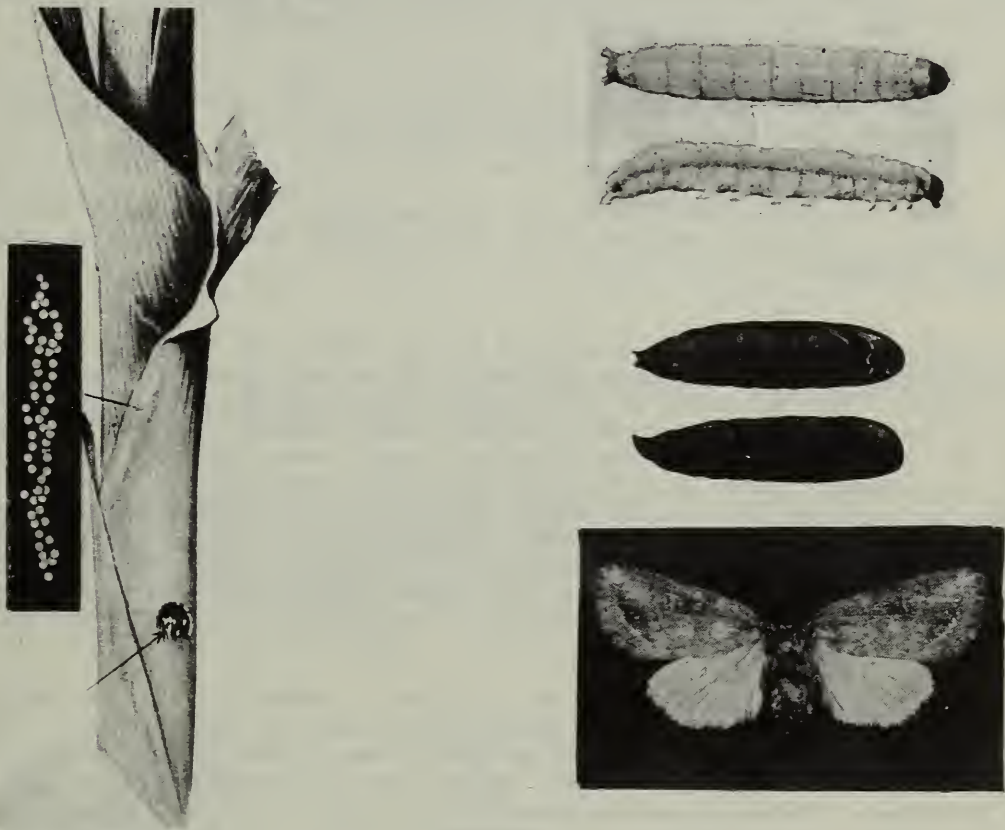
Life History and Habits: Life history in South Africa is as follows: The moths first appear in December when most of the corn is established. Eggs are deposited at night in batches of up to 150 or more, between the leaf sheath and the stem. A single moth may lay about 1,000 eggs. Larvae hatch in about a week and feed on leaves for a few days then burrow into the stem. Some may migrate to adjacent plants, however. The larvae mature in little over 30 days and pupate in the burrows. After 16 to 20 days adults emerge. Larvae of the second generation complete growth during March. In some years, there may be a partial third generation. The insect may overwinter as full-grown larvae or pupae in cobs or stalks of corn but in tropical areas it appears to remain active throughout the year. In South and East Africa the species seems to flourish in drier parts of the African savannah but in West Africa it is only important in wetter areas of the tree savannah.

Description: Adult male - Expanse 26-34 mm. Palpus light ochreous, moderately to heavily infusate. Antenna of male bipectinate, serrate at apex, cilia short, fasciculate; female antenna simple. Head, legs and abdomen ochreous.

Phalaenidae, Lepidoptera

Forewing dull coppery brown, with row of four or five small, black spots parallel to outer margin; each spot bordered outwardly with creamy-yellow area. Hindwing white suffused with light ochreous. Adult female - Expanse 30-44 mm.; similar to male but sometimes darker. Egg - Creamy white, 0.64 mm. in diameter. Larva - Mature larva about 33 mm. long, usually creamy white with smoky band on each side in region of spiracles. Head reddish, spiracles black, smoky setiferous papillae on all but last body segments.

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies).  
CEIR 7(24) 6-14-57



Eggs from beneath leaf sheath (enlarged) and opening in stalk through which adult escapes.

Larva and Pupa (enlarged)  
Adult (about natural size).

Figures except adult from Mally, C. W. 1920. Union of South Africa, Dept. Ag Bul. 3, 111 pp. Adult - USDA photograph.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

RICE STEM BORER or PADDY BORER (Schoenobius incertulas (Walk.))

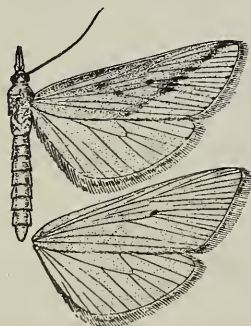
Economic Importance: The species infests rice throughout the tropical regions of Asia. For years, this pyralid has been the most serious pest of rice in China. Severe outbreaks occurred in 1917, 1929 and 1935. Damage in some years in southern India was estimated as high as 65 percent of the rice crop. Dead hearts or white heads are characteristic signs of injury. In 1955 the rice stem borer destroyed 15 percent of the rice crop at Gujranwalla in the Punjab and reduced the average rice yield from 656 to 329 pounds per acre at Umerkot, Sind.

Distribution: Burma, Ceylon, China, Formosa, India, Indochina, Indonesia, Japan, Malaya, Okinawa, Pakistan, Philippines, Thailand.

Hosts: Rice and other species of the genus Oryza. There have been reports of S. incertulas attacking grasses such as sugarcane and corn in southwestern Asia and wheat in Burma.

Life History and Habits: In parts of China there are 4-5 overlapping generations a year. Eggs, laid in clusters of about 70 on the upper surface of leaves, hatch in 3-18 days. The majority of the larvae bore through the leaf sheath, but some settle on the leaf blade and feed on the leaf tissues. A few bore into the mid-rib of the leaf sheath. Larvae usually remain near the root to feed and as a result the tissues near this part of the plant are destroyed. The rolled-up leaf is often so injured that it is easily broken off at point of attack. In order to seek a new host, some larvae suspend themselves by a silken thread and may be blown by the wind or float on the surface of the water. Under favorable summer conditions the larval stage lasts 23-37 days, the pupal stage 8-9 days. Overwintering larvae are found in cocoons in rice stubble or just below the ground surface.

Description: Adult male: 18-23 mm. expanse. Forewing dull brownish yellow with a sprinkling of darker scales; a small black spot at lower angle of cell; an indistinct oblique fuscous line from apex toward hind margin and a marginal series of minute dark spots on the veins. Hind wing yellowish white. Adult female: 24-36 mm. expanse. Forewing pale straw yellow, with a slight sheen and without markings except for a conspicuous dark spot at lower angle of cell. Hind wing white, often with yellowish suffusion toward outer margin. Mature larva: 20-25 mm. long. Head and thorax pale amber, head coloration somewhat reticulate. Body slender, creamy white; setae inconspicuous except under magnification; spiracles very narrow, slitlike; with 3 pairs of thoracic legs; 4 pairs of abdominal and 1 pair of anal prolegs present, abdominal and anal prolegs short; crochets on abdominal prolegs uniordinal and in a complete circle, on anal legs irregularly biordinal and in a transverse mesoseries.



Adults Enlarged  
Male Above, Female Below

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7 (14) 4-5-57

Figures from Iconographia Insectorum Japonicorum, 2nd edit., 1954. Tokyo, 1736 pp.

Pyralididae, Lepidoptera

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SENN PEST (*Eurygaster integriceps* Puton)

Economic Importance: This pentatomid is one of the most destructive pests of grain in the Near East. Main damage to the grain is two-fold: adults feed on stems of young plants and later adults and nymphs attack the kernels. The former damage often amounts to loss of over 25 percent of stand in non-irrigated fields while attack on kernels, by no more than two to three insects per square yard, can cause total loss of crop. Another type of damage is caused by introduction of enzymes into the grain which lower the baking quality of the flour. Although losses caused by this insect vary over the region, they are seldom less than 25 percent of the crop. It has been said that the pest causes more damage than grasshoppers in Iraq in some seasons. In Iran, during periods when the entire wheat crop was destroyed, the inhabitants were forced by famine to move from one part of the country to another. Heavy damage is reported from some areas of Russia. According to a survey carried out in Turkey in 1956, as many as 1.5 million hectares of cereals were infested by the senn pest.

Distribution: Afghanistan, Crete, Greece, Iran, Iraq, Israel, Jordan, Lebanon, Pakistan, Syria, Turkey, USSR.

Hosts: Wheat, barley, rye, oats, millet, sorghum, spurge, sunflower, flax, clover and thistle are included among the host plants.

Life History and Habits: Overwintering bugs hibernate in the soil around the roots of grasses in hill sections and under litter in valleys, then migrate to fields in the spring. The female lays up to 180 eggs, as a rule, very close to the ground on leaves and stems of host plants and also on non-grainous weeds. Hatching occurs in 10-12 days. By the end of June nearly all the new generation have reached the adult stage. There is only one generation a year.



Description: Length 11-12 mm. Body oval, convex above, yellowish brown with small black spots usually arranged into a pattern of linear markings. Head triangular, rounded in front, broader than long and with 2 longitudinal parallel grooves. Scutellum very large, longer than abdomen which it almost entirely covers. A calloused yellow line runs along 2/3 of mid line of scutellum. Base of scutellum has 2 raised yellow spots. Exposed dorsal margins of abdomen shows alternating light and dark areas. Ventral surface of body pale except for black spot at apex of scent gland canal. Tarsi with 3 joints, the second much smaller than the others. Antennae 5 segmented, last two segments darkened. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies).

Adult greatly enlarged  
(after Vodjdani)

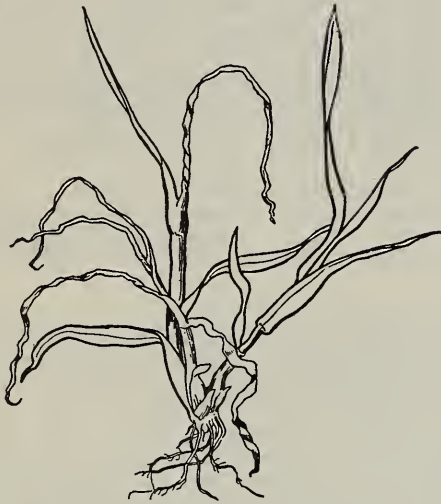
February 1, 1957



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

WHEAT BULB FLY (Hylemya coarctata Fallen)

**Economic Importance:** Larvae of this muscid caused an estimated minimum loss of about 1,200,000 pounds sterling on wheat in England in 1953. The infestations were responsible for reseeding of 59,000 acres and partial replanting of an additional 58,000 acres. Another 85,000 acres were affected to various extents. Large outbreaks, involving from 12 to 44 percent of wheat stems, occurred in Russia in 1913. Wheat, rye and sometimes barley are damaged in several other European areas. Outbreaks in Denmark tend to be more severe when winters are mild and damage in England and Scotland is usually found in areas with less than 30 inches of annual rainfall.



Damaged Wheat Plant

**Distribution:** Occurs in Austria, Denmark, France, Germany, Poland, Netherlands, Norway, Sweden, USSR (European and eastern Siberia) and the British Isles. There are also records from Tunisia and Iraq.

**Hosts:** Winter wheat is chief cultivated host but will attack winter rye and barley. Oats are not attacked. Among wild hosts, quackgrass is preferred in England.



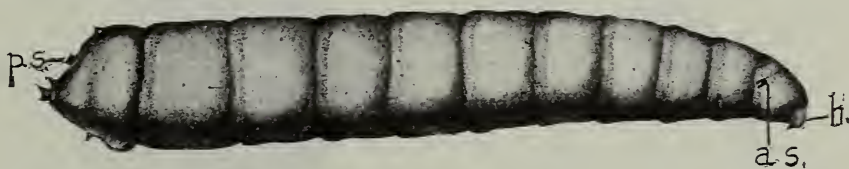
General Distribution of Wheat Bulb Fly

(Muscidae, Diptera)

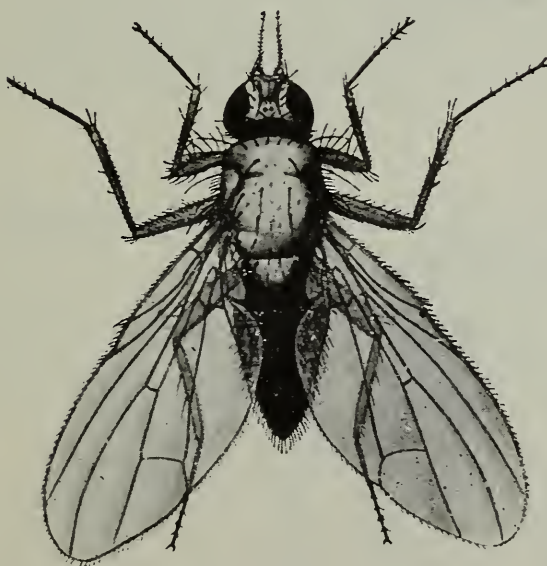


Life History and Habits: The fly has one generation a year generally. In England eggs are laid in summer and hatch in late January or early February. Larvae enter the wheat stem through the basal node, usually causing decomposition and discoloration within 24 hours. They settle in the central hollow of shoot just below ground level though they may occur above ground later. The larvae begin to leave the plants by last of April and usually pupate by mid-May. One larva may attack 6 or more plants, the third instar being able to travel 18 inches. Adults emerge from June through early August, with the peak emergence about mid-June. Females deposit around 22 eggs, which are laid singly in groups of 2 or 3, immediately below or on the surface of loose soil.

Description: Adult male thorax ochreous gray with some indeterminate black markings, sides lighter. Abdomen narrow, darker than thorax, hairy with some obscure transverse striae and a faint interrupted dorsal stripe. Wings yellowish, with narrow yellowish-brown veins. Halteres pale; costal spine small. Legs black; tibiae piceous. Thorax and abdomen of female without markings; legs with four posterior femora and all tibiae pale. Length 6-8 mm. Eggs creamy white, slightly concave, pointed one end, flattened at other. Fine longitudinal surface markings in form of ridges and curves which run into one another. Length 1.8 mm. Newly hatched larva differs from later instars by having two pairs of unserrated cephalic hooks, one pair above the other; the more mature larva has one pair of serrated cephalic hooks. Anterior spiracles possess 7-8 undivided papillae. The caudal end is truncated and beveled dorso-ventrally, and has a characteristic arrangement of spines. Length 20 mm. There are three larval instars. Puparium is typical of the Muscidae. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7 (48) 11-29-57



Larva



Adult of Hylemya coarctata



Caudal Corona of Larva  
showing Tubercles

Figures (except map): Larva and damage from Smith, K. M. 1948. A Textbook of Agricultural Entomology. 289 pp., Cambridge (Gt. Britain). Adult from Rostrup, S. and Thomsen, M. 1931. Die Tierischen Schadlinge des Ackerbaues. 367 pp., Berlin.

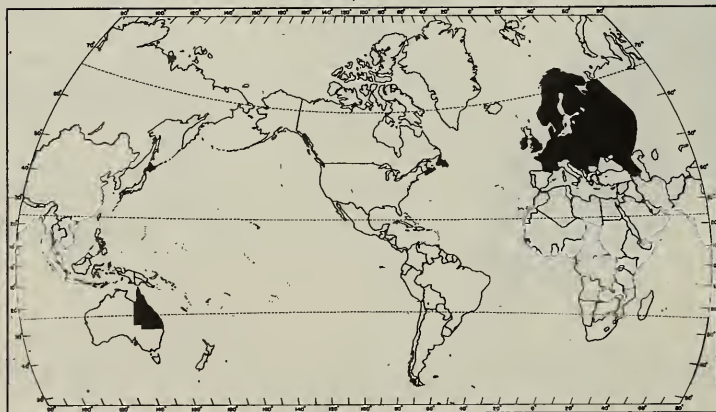
## INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

### APPLE SUCKER (Psylla mali Schmidberger)

Economic Importance: Apple sucker is a serious pest of apple in many European countries and has caused considerable concern in orchards in the provinces of Nova Scotia and New Brunswick, Canada, in some years. It is considered one of the most serious pests of apple in Norway. A study conducted in the lower Elbe region of Germany in 1925 showed P. mali to be the most important factor in decreased apple yields in that area. Populations were so abundant in the Havel River fruit district of that country in 1920 that most of the apples failed to ripen. England has recorded as much as 70 percent damage to the apple crop in some areas. Among other countries reporting severe damage are Sweden, Denmark, Switzerland and Russia. Following discovery of the psyllid in Nova Scotia in 1919, damaging infestations were reported during the next decade in that area; however, in recent years most infestations have been light to medium although a few severe infestations occurred in 1955. Infestations cause shriveling of blossoms and yellowing and dropping of foliage. They are of greatest importance when blossoming and fruit-set are light to moderate.



Apple Sucker Damage to Apple Twig and Fruit



General Distribution of Psylla mali



Distribution: Canada (New Brunswick, Nova Scotia), Australia, Austria, Czechoslovakia, Denmark, England, Germany, Holland, Ireland, Japan, Norway, Poland, USSR, Sweden, Switzerland, Finland, France, Belgium, Yugoslavia, Rumania, Hungary, Poland.

Hosts: Apple preferred. Pear, plum, quince sometimes attacked.

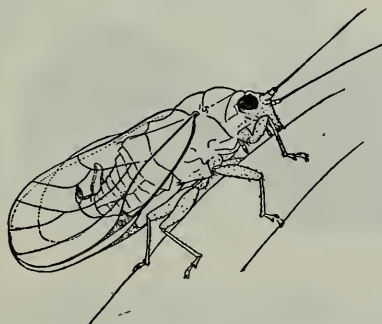
Life History and Habits: In Nova Scotia, Canada, nymphs hatch when apple buds are about half open and enter terminals where they feed at the base of leaves and flower stalks. As nymphs approach maturity they move out and feed on fruit stems, leaf petioles and blades. Nymphal stages last from four to five weeks. Adults remain on the trees until late in the fall. They feed slightly but cause no apparent damage. Egg laying begins in September on the current season's growth, chiefly on fruit spurs. As many as 85 eggs have been observed around a single bud. On warm days adults jump rapidly and take to flight when disturbed. The nymphs excrete large quantities of honeydew and the presence of this substance is an identifying characteristic of the insect's presence in an orchard.



Eggs On Twig

Description: Adult, in summer, pale green tinged with yellow. Eyes pale green, dark reddish brown at center. Ocelli bright orange-yellow. Antennae green at base, remainder yellowish brown to black on last two segments. Beak black at tip. Wings transparent, iridescent, veins of forewings yellowish. Tibial and tarsal spurs and claws jet black; legs lighter. Posterior margin of each abdominal segment except the last, orange-yellow. As the season progresses, coloration changes, especially in the female. Generally the light colored membranes become more brilliant and dark chitinated portions more intense.

Total length of body to tip of folded wing - 3.7 to 4.0 mm. Fifth-instar nymphs pale yellowish green, tip of abdomen orange to brown. Wing pads pale, dirty yellow. Eyes whitish with dark centers. Antennae dusky black at tip. Length 1.7-2.1 mm. Egg cylindrical, elongate, broadly rounded at apex. A short spine-like process projects from ventral surface, attaching egg to twig. Color whitish when first laid, becoming yellow and later reddish orange. CEIR 7 (50) 12-13-57



Psylla mali Adult and Fifth-instar Nymph

Figures (except map) from Speyer, W. 1929. Der Apfelblattsauger Psylla mali Schmidberger. 127 pp., Berlin.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

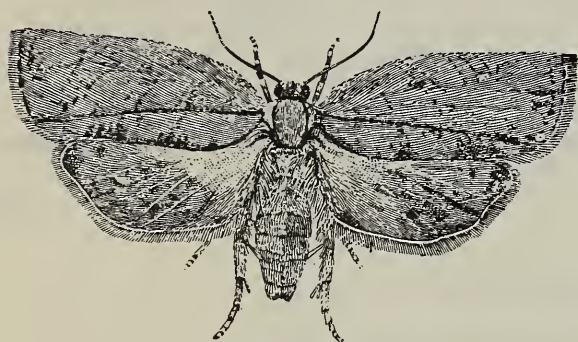
LIGHT-BROWN APPLE MOTH (*Austrotortrix postvittana* (Wlk.))

Economic Importance: Light-brown apple moth has become a major pest of apples in Tasmania (Australia) and certain parts of New Zealand. In years of abundant populations the tortricid may cause as much as 25 percent loss of the apple crop in Tasmania. It is listed as one of the most troublesome pests of citrus in New Zealand. Damage to fruit in storage has also been recorded.

Distribution: This pest is indigenous to Australia and occurs in all apple-growing areas of that country but is chiefly found in a belt around the coast extending inland about 200 miles at the widest point. It also occurs in New Zealand, New Caledonia, Hawaii and England.

Hosts: Apple, litchee, strawberry, grape, pear, orange, apricot, currant, oak, pine, chrysanthemum, rose, eucalyptus and acacia. Also other garden and greenhouse plants.

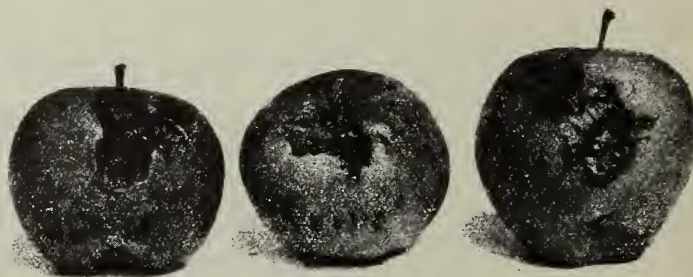
Description and Life History: Life history of *A. postvittana* in Tasmania is as follows: Moths begin appearing in orchards during early summer. They are pale brown in color, less than half-an-inch long when resting. If disturbed, they make short erratic flights. Eggs are laid on apple leaves in batches of about twelve. They are pale green and almost flat. Young larvae feed principally on the underside of leaves in silken tunnels lying alongside the veins or the midrib. After about three weeks they abandon tunnels and continue to feed causing "ragging" and curling of foliage and pitting and scarring of fruit. The larvae pupate in folded or webbed leaves. In late summer another brood of moths emerge. Small caterpillars from this brood feed as long as the leaves remain on trees. Then the larvae drop and feed on cover crops or survive on orchard floor without feeding. At end of September when early shoots appear these larvae climb the trees and feed on such growth as is available. By the "pink-bud" stage a large proportion of blossom clusters nearest ground may be infested. This brood completes development in late October and gives rise to flights of moths. In Tasmania, there may be 3 generations a year on evergreens. (Prepared by Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(9) 3-8-57.



Adult greatly enlarged

Figures. Adult from Australian Insects, K. C. McKeown, 1944, 303 pp. Sydney. Damage from Suppl. Tasmania Jour. Agric. 8(3):1-18, 1937, J. W. Evans.

Tortricidae, Lepidoptera



Characteristic larval damage to fruit

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

ORIENTAL BLACK CITRUS APHID\* (Aphis citricidus(Kirkaldy))

Economic Importance: Although this aphid has been known for many years as a destructive pest of citrus, its economic status was elevated sharply in 1946 when Brazilian research discovered that it transmitted the devastating tristeza disease of citrus. The disease caused loss of 7 million orange trees in the State of Sao Paulo, Brazil, alone between 1936-46. It is responsible for premature decline of grapefruit in South Africa and Australia and is a limiting factor in small sour lime production in West Africa. Millions of citrus trees have been attacked or are threatened in other countries. Aphis citricidus reportedly accounted for the rapid spread of tristeza in Brazil and Argentina following introduction of the disease into those countries. The insect has been confirmed as a vector also in Africa and Australia. As an agent of primary damage, it is most injurious to the young growth of citrus causing arrested development. The pest was rated as one of the five most important insects in Rhodesia in 1925 following a season of serious infestations. Severe damage is also reported from Formosa, Mauritius, New Zealand and other areas.

Although A. citricidus has not been recorded in the United States, strains of tristeza, or quick decline, virus occur in citrus in areas of California, Florida and Louisiana. Spread and intensity of the disease in this country, however, have been much less than in countries where the aphid is present.



Aphis citricidus  
Infesting Citrus Twig



Tristeza Disease  
in Orange Tree

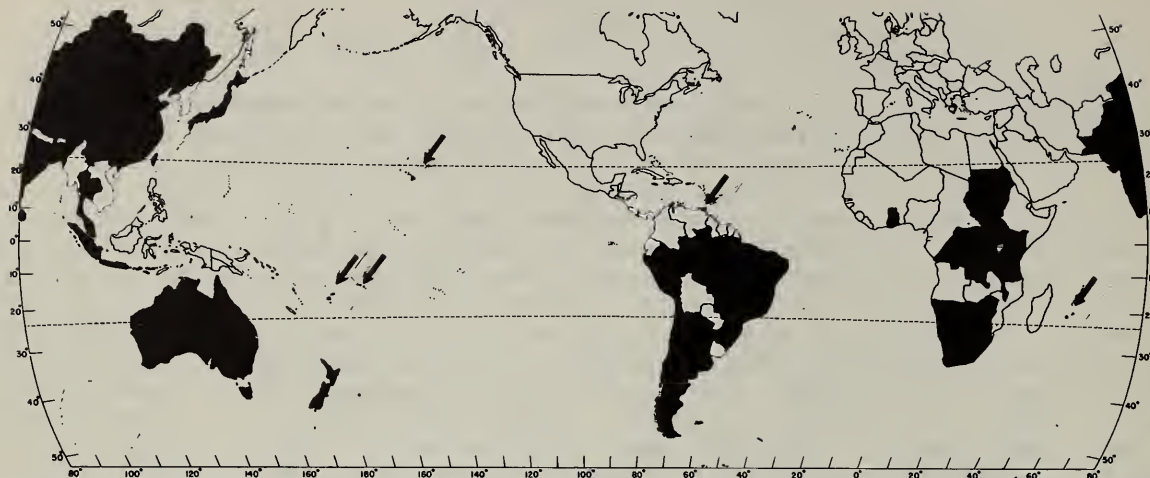
Distribution: Most of Asia, Africa (generally south of the Sahara), Mauritius, Samoa, Fiji, Hawaii, New Zealand, Australia, Argentina, Brazil, Chile, Peru and Trinidad. Although A. citricidus has been reported from the Mediterranean region, records from that area have not been verified.

\* Also called brown citrus aphid, tropical citrus aphid. (Aphidae, Hemiptera)

Figures: Infested twig from Cottier, W. 1938. New Zealand Jour. Agr. 57(4): 332-333. Tristeza disease of orange from Wallace, J. M. 1956. FAO Plant Protect. Bul. 4(6): 77-87. Aphid (drawn by Abernathy) from Zimmerman, E. C. 1948. Insects of Hawaii, Vol. 5, 464 pp. Honolulu.



General Distribution of Aphis citricidus

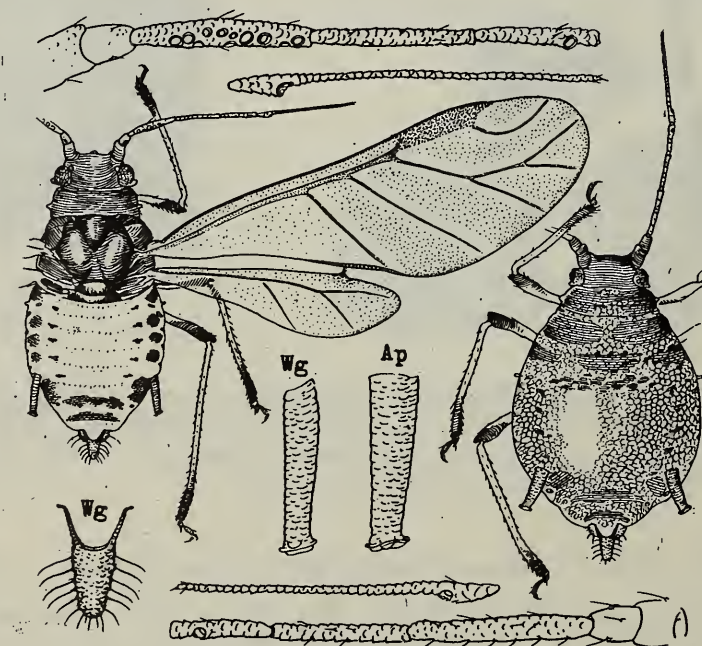


Hosts: Citrus including orange, lemon, grapefruit and lime. Also reported on cotton, azalea and Evodia hupehensis.

Life History and Habits: A. citricidus is viviparous. Development to maturity requires around 12 days. In New Zealand small colonies are found on terminals of citrus during the winter and the summer form of reproduction continues the year round although greatly slowed in the dormant season. Winged forms appear intermittently in the colony and these serve to disperse the population. As spring begins the colonies increase rapidly with the young growth. Severe host deformation occurs in heavy infestations. The pest is most prevalent in spring and early summer.

Description: Apterous form is black and about 2 mm. long. Base of antennae lighter, usually brownish. Parts of legs also not as dark as body. The winged aphid has same general coloring and is about the same length. The wings are transparent and colorless. Taxonomic details are shown in the illustration. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)

CEIR 7(38) 9-20-57



Oriental Black Citrus Aphid (Aphis citricidus)

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

QUEENSLAND FRUIT FLY (Dacus tryoni (Frogg.))

Economic Importance: This tephritid is a serious pest of pome and stone fruits and is apparently very destructive to some citrus varieties during peak population years. Outbreak of 1940-41 in New South Wales caused rejection of 5-25 percent of citrus at harvest. Reports indicate the need to use systematic control in fruit areas to avoid heavy losses. Some fruits, such as grapes and bananas escape injury except during peak years. Dacus tryoni appears to be as destructive to fruit production in its Australian range as the oriental fruit fly in the countries where it appears. Commercial stone fruit orchards have been abandoned in Queensland largely due to D. tryoni.

Distribution: Australia: New South Wales, Queensland, South Australia, and Victoria.



General Distribution of Queensland Fruit Fly

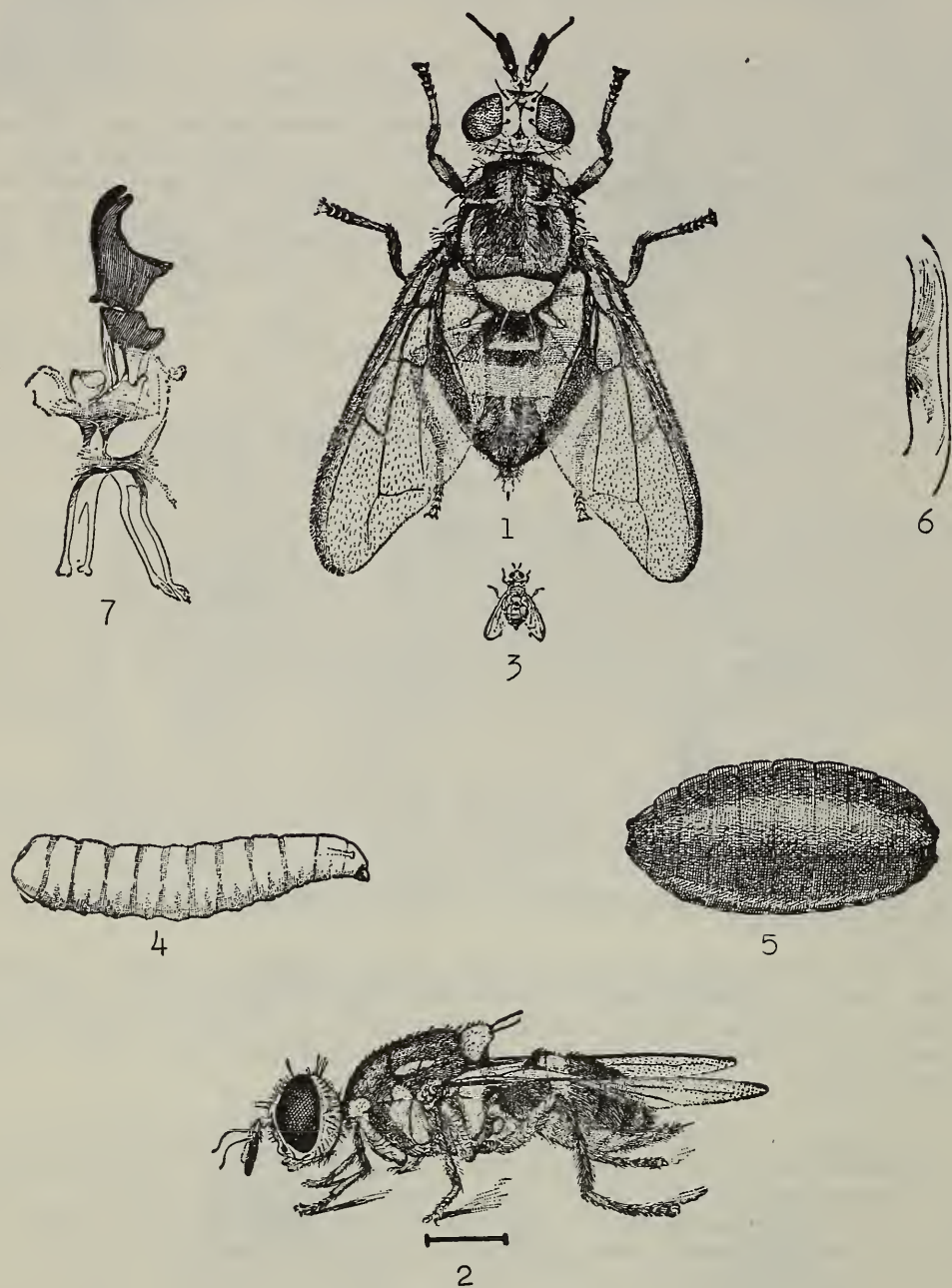
Hosts: Some of the hosts include: Papaya, sour orange, lemon, grapefruit, Mandarin orange, sweet orange, guava, cashew, cucumber, quince, persimmon, banana, loquat, fig, tomato, apple, mango, mulberry, apricot, peach, sour cherry, garden plum, nectarine, pear, grape and Rubus sp. The species has also been recorded on over 40 additional hosts.

Life History and Habits: This insect passes the winter (June-October) in the adult stage. Female adults, after passing through a two-week preoviposition stage following emergence from the pupae, deposit eggs in groups, up to seven eggs per group, in fruit punctures. As many as 40 larvae have been found in one peach. Under favorable conditions eggs hatch in 2-3 days and larvae are full grown in 5-7 days (average period 20 days). Pupae remain in the soil from a week in summer to a month or more in cooler weather. The total life cycle requires from 2-3 weeks in summer (February) to two months in autumn (May). Adult females live for lengthy periods and four or five overlapping generations develop annually.

Description: The female adult is 6 mm. long (see illustration), has a wing expanse of 10-12 mm. and transparent wings. The fly is brown marked with yellow. On the thorax a broad creamy, often pale, dorsal band runs down the scutellum and there is a well-defined narrow pale yellow stripe on each side. The abdomen is constricted at the base but broadly rounded at the tip. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies) CEIR 7(3) 1-10-57



QUEENSLAND FRUIT FLY (Dacus tryoni (Frogg.))



1. & 2. Adult (enlarged)

3. Adult (natural size)

4. Larva (magnified 5 times)

5. Pupa (magnified 7 times)

6. Anal segment (magnified 27 times)

7. Horny mouth parts of larva  
(magnified 88 times)

(After Froggatt)

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

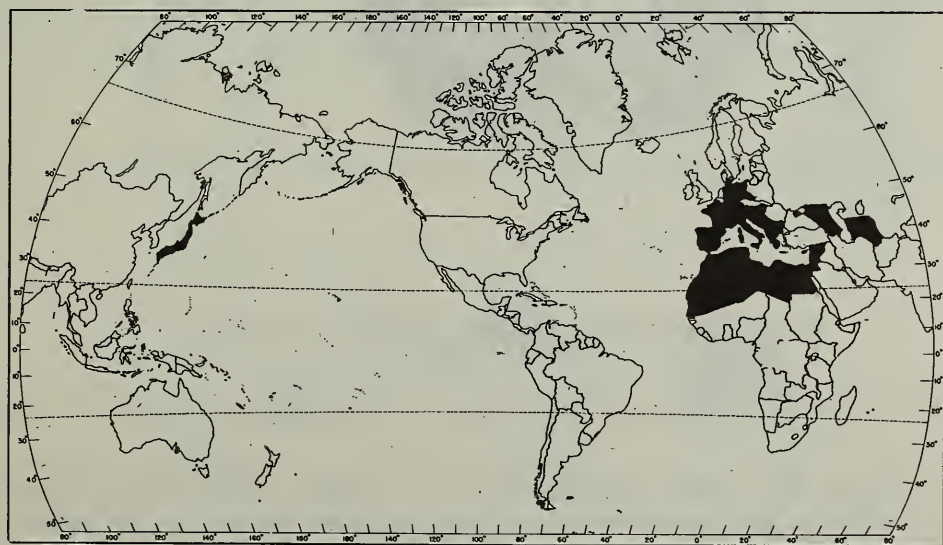
VINE MOTH (Lobesia botrana (Schiff.))\*

Economic Importance: This olethreutid is a serious pest of grapes in many parts of Europe and Asia. The larvae feed on flower buds, developing berries and, finally and most destructively, on the ripening fruit. Loss of as much as one-third of the vintage has often occurred in areas of Syria, Israel, U.S.S.R. and Yugoslavia. Infestations up to 75 percent have been observed in the Astrakhan region of U.S.S.R. and an outbreak in the Touraine section of France in 1913 was so severe that only a few growers were able to save their crops. In France the moth was only of local importance around 1890 but by 1920 it was a serious menace to practically all vineyards in the country. Outbreaks were unusually severe in many districts of central Europe in 1925 and in Germany in 1927. In addition to primary damage to the grapes, the wounds made by L. botrana attract other insects and predispose the fruit to pathogenic fungi.



Vine Moth Damage to Grapes

Distribution: Southern and middle Europe, northern Africa, Near East and Japan.



General Distribution of Lobesia botrana

\* Formerly Polychrosis botrana. Olethreutidae, Lepidoptera



Hosts: Although *L. botrana* is primarily a pest of grape, it has been recorded from many other hosts. Among these are currant, blackberry, plum, gooseberry, jujube, dogwood, privet, sumac, viburnum, Virginia creeper, strawberry madrone and spurgeflax daphne. The last two plants seem to be preferred hosts in some areas.

Life History and Habits: Under conditions in Georgia, U.S.S.R., adults from overwintering pupae emerge by end of April. The eggs are deposited on flower buds of grape and generally hatch in 5 to 6 days. Before feeding on a cluster of buds the young larva spins a web around it. The larva feeds on the buds for about three weeks, then pupates in the bud clusters or under rolled edges of leaves. The pupal stage lasts 12-15 days. Adults from this brood oviposit on fruit in the second half of July, the eggs being laid singly. Larvae hatch in 4-5 days and penetrate the grapes, one to each fruit, preferably on the shady side of the bunch. The infested berries shrivel or become rotten. These larvae pupate generally inside the dried berries. Larvae of the third generation, the most damaging, feed on the ripening grapes, migrating from one to another and spinning webs. Few of these larvae pupate before harvest and many are gathered with the grapes. Pupation and hibernation occur in cocoons among fallen leaves, in berries or cracks of the soil or under vine bark. Observations show that the insect can resist intense cold but warm, wet winters are detrimental.

Description: On hatching the larva is about 1 mm. long and greenish in color. The full-grown larva is 9 to 11 mm. long by about 2 mm. wide. Color is very variable, being shades of green, rose, red or brownish-red. Head capsule is honey-yellow colored with black eye spots. The larva is noted for its agile and lively behavior. Adult has wing expanse of 11.5 mm. to 13 mm. The general coloring is reddish-gray. When the moth is at rest the wings are folded. There are three transverse bands on the forewing. Toward the extremity of each wing is a black triangular spot. The hindwing is grayish-brown. The larvae and pupae of this species resembles those of the native *Paralobesia viteana* very closely. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(30) 7-26-57.



*Lobesia botrana* Larvae, Adult and Pupa  
(Enlarged)

Figure of adult from Florence(Italy) Stazione d'Entomologia Agraria, page 326, 1915.

Other figures, except map, from Ruiz Castro, A. 1943. Fauna entomologica de la vid en Espana. Estudio sistematico-biologico de las especies de mayor importancia economica. Part I., 150 pp.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

WINTER MOTH (Operophtera brumata (L.))

Economic Importance: This pest was first known to be present in North America in 1949 when it was found in Nova Scotia, Canada. Apparently it was well established in the area by that time and it has continued to spread within the Province. Severe defoliation has occurred on such major hosts as apple, oak, maple, elm and basswood. A local outbreak at Grand Pre in 1955 caused about 80 percent defoliation of untreated apple orchards and various hardwood species. Insecticides were necessary against this insect and the fall cankerworm in many orchards during 1956 to prevent serious defoliation and marring of fruit. Winter moth has been recognized as a major pest of fruit and forest trees for many years in areas of the Old World. An outbreak in central Poland in 1935-36 caused complete defoliation of forest trees. Hazel trees are sometimes severely defoliated in extensive areas of Italy. Serious losses on fruits are recorded in the British Isles, Denmark, Czechoslovakia, Algeria and parts of USSR. Loss from the pest amounted to 90,000 pounds sterling in the Vistula region of Germany between 1916-20. Studies in Holland between 1941-43 showed O. brumata was the most harmful insect on cherry flowers in that country.



Damage to cherries and hazel twig by Operophtera brumata.



General Distribution of Winter moth

Geometridae, Lepidoptera



Distribution: Most of Europe, USSR (European part and Soviet Far East), Japan, Algeria, Tunisia and Nova Scotia.

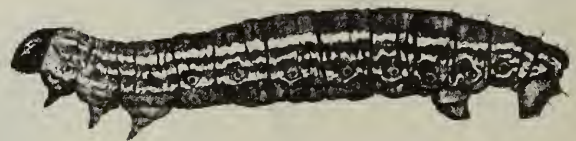
Hosts: Attacks deciduous fruits including apple, plum, cherry, quince, pear, apricot, peach, gooseberry and currant; hardwood trees such as oak, birch, walnut, beech, elms, hornbeam and various ornamentals.

Life History and Habits: In the British Isles, the life history is as follows: Adults appear from October to January, males flying in the evening being attracted to lights. Females emerge from the soil and ascend tree trunks to deposit eggs after fertilization. They cannot fly. The eggs, as many as 350 per female, are placed on branches and terminals. Larvae hatch in March and April when buds reach the breaking stage. They burrow into fruit buds, then feed in blossoms and loosely webbed leaves. Before maturity the larvae migrate over the tree, feeding freely on foliage and young fruit. By mid-June they drop to ground, enter soil and spin cocoons in which they pupate.

Description: Adult - Male wing expanse 25 to 32 mm., forewings light brown-gray with several faint transverse bands. Hindwings pale grayish-white. Antennae simple. Body slender. Female wings reduced to stumps, body gray to grayish-brown. Abdomen prominent. Legs long. Eggs light green changing to light orange, surface pitted, about 0.5 mm. in length. Young larva dirty-green with dark head. Full grown larva 25 mm. long, green with dark dorsal line and three yellow stripes along each side; head dark-brown. Pupa light brown, encased in loose flimsy cocoon.

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.).

CEIR 7 (46) 11-15-57



Adults and larva of Operophtera brumata

Figure of larva from Boas, J.E.V. 1923. Dansk Forstzoologi. 763 pp. London. Damage to cherries from Frickhinger, H.W. 1955. Lietfaden der Schadlingsbekämpfung. 505 pp. Stuttgart. Larval damage to leaves from Silvestri, F. 1941. Contribuzioni alla Conoscenza degli Insetti Dannosi e dei Loro Simbionti. Bol. del R. Lab. di Ent. Agr. di Portici 5:61-120. Adults - USDA Photograph.

INSECTS NOT KNOWN TO OCCUR IN UNITED STATES

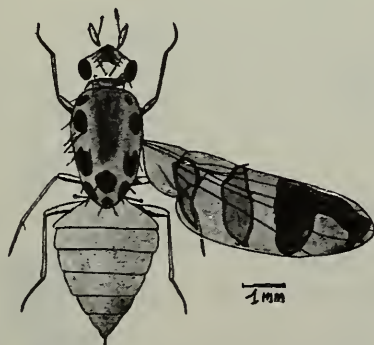
BALUCHISTAN MELON FLY (Myiopardalis pardalina (Bigot))

Economic Importance: Myiopardalis pardalina is a serious pest of melons in Caucasus and Syria; also in Israel where up to 60 percent of watermelon crops and 85-90 percent of muskmelons and other melons are reportedly infested in some years. Observations in Baluchistan, Pakistan indicate that 40,000 melons, if bagged against fly attack, can be produced in an area where only 2500 can be produced if the crop is not bagged. History and distribution of this tephritid indicate it to be more capable of adapting itself to area conditions in the United States, if introduced, than any of the Dacus curcubit flies.

Distribution: India, Pakistan, Russia (Caucasus), Iran, Turkey, Lebanon, Israel, Iraq, Syria.

Host Plants: Watermelon, cucumber, muskmelon, snake melon, pumpkin, squirting-cucumber and phoont (Cucumis trigonus).

Life History and Habits: Passes the winter in soil. In Caucasus emergence begins in June and continues until July. Oviposition begins in about a week and continues for about three weeks, each female laying at least 100 eggs in the pulp of fruit, preferably in newly-set fruits. Melons of about 3-5 inches in diameter under observation were not attacked. The egg stage varies from 2-3 days in summer to a maximum of 7 days in autumn; the larval period lasts 8-18 days; and the pupal stage, 13-20 days or more. Larvae on hatching burrow into the fruit where they feed on the seeds, juice and pulp until time for pupation, when they tunnel out of the host to pupate in soil. Three incomplete generations, which overlap considerably, occur in a year.



Adult greatly enlarged.  
(after Risbec)

Tephritidae, Diptera

Description: The head of the adult is golden colored. The eyes are not prominent. The ocelli are small and close together. Antennae are golden with chaetae of same color. There are long dark chaetae on the face. The reddish anterior median zone of the thorax has numerous small golden hairs. Several dark brown spots are arranged around the sides and posterior end of the thorax. Ventral surface of the thorax is pale yellow with fine golden hairs. Abdomen is triangular and slightly darker than the head. Legs are clear pale yellow. Wings are transparent with one yellow spot near base, a yellow band across middle and V-shaped yellow spot near tip. Body of female is 8 mm. long, the male 6 mm. The pupa is deep red with numerous striations encircling the body in addition to those separating the segments. It is 7 mm. long and 2 mm. wide. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). February 8, 1957



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

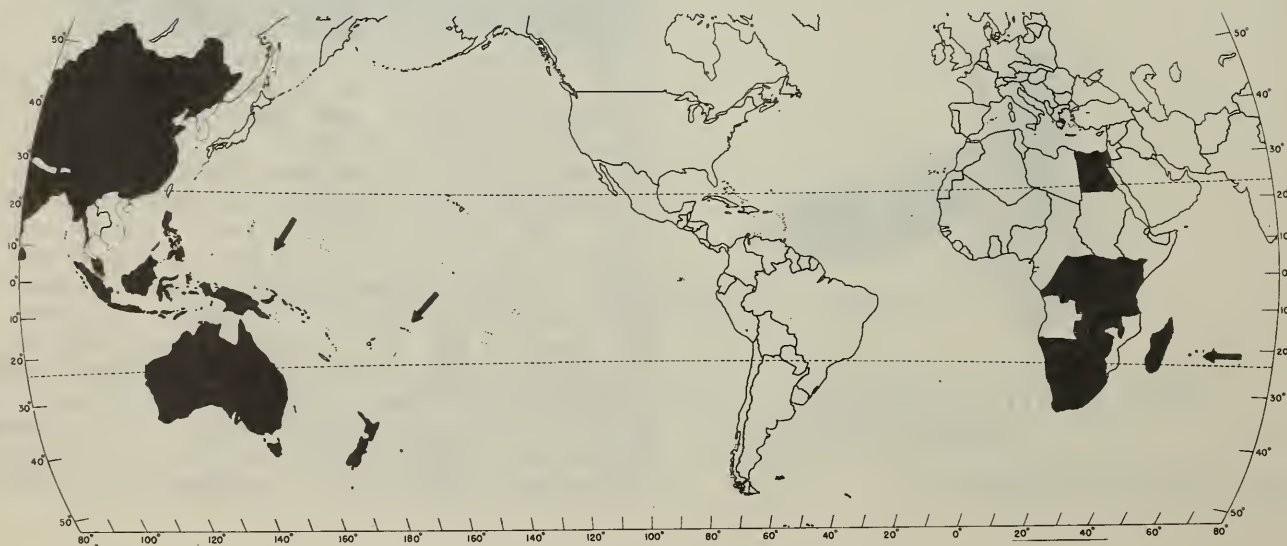
BEAN FLY (Melanagromyza phaseoli (Coquillett))

Economic Importance: This leaf miner frequently causes total loss of the bean crop in a number of tropical and sub-tropical countries. In Australia it is largely responsible for restriction of the bean-growing season to the cooler months and even then can cause serious losses if the winter is mild. New South Wales rates the fly as the most important pest of beans. Infestations up to 100 percent are recorded in Kenya and Tanganyika with resultant losses of 50 to 100 percent. Replanting of the bean crop has been necessary in Egypt and heavy damage occurs in Belgian Congo. Soybeans are severely damaged in China and Java, though usually following a green manure crop. Considerable reduction in stand of cowpeas is reported from Ceylon.

Distribution: In Africa known to occur in Tanganyika, Union South Africa, Kenya, Uganda, Rhodesia, Belgian Congo, and Egypt. Areas infested in Asia include East India, Burma, Malaya, Ceylon, Singapore, Indonesia, New Guinea, China and Philippines. Also recorded in Mauritius, Madagascar, Australia, New Zealand, Guam and Samoa.



M. phaseoli Damage to Beans  
(egg-laying punctures, larval mining, stem injury)



General Distribution of Bean Fly

Hosts: Principally a pest of beans including snap and lima beans, but also an important pest of cowpeas and soybeans in areas. Other reported hosts include nightshade, chick peas, Dolichos sp. and crotalaria.

Life History and Habits: Eggs are deposited in the upper leaf surface. The base of the blade seems preferable. Punctures may be very numerous but frequently only small numbers contain eggs. Hatching occurs in 2-4 days in warm weather and the larva mines in the leaf and eventually finds its way to a vein and thence down to the stem. Larval stage requires about 9 days. Pupation, lasting from 9 to 12 days, occurs in the main stem though sometimes in lateral stems. Complete life cycle requires 17 days during peak season in Egypt; however, it varies from 21 to 47 days, according to temperature and altitude, in Java. M. phaseoli is primarily a pest of seedling beans. An acute infestation of young plants is characterized by drooping of first two leaves and yellowing. If plants survive initial attack, the stems burst (normally at the ground level) where the pupae and larvae congregate and large rusty-red calloused areas develop.

Description: The adult is small, measuring about 2.5 mm. in length, shiny black with reddish eyes. Body strongly tinged with blue, polished, not light-colored, pruinose. Thorax bearing two pairs of dorso-central macrochaetae. Wings nearly transparent, costa strongly thickened beyond apex first vein, small cross-vein distinctly beyond middle of discal cell, hind cross-vein at three-fourths of its length beyond small apex of third vein midway between apices of second and fourth veins. Tibial and tarsal joints not noticeably dilated or swollen. The egg is white, oval and measuring 175 by 345 microns. Mature larvae creamy white, 4.25 mm. long. Pupa yellow to brown and about 3 mm. in length. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(37) 9-13-57



Figures of damage from Caldwell, N. E. H. 1939. Queensland Agr. Jour. 52(4): 393-396.

Figures of life stages from Hassan, A. S. 1947. Soc. Fouad 1<sup>er</sup> D'Ent. Bul. 41: 217-224.

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Agromyzidae, Diptera



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BEET BUG (Piesma quadratum (Fieber))

Economic Importance: Adults of this piesmatid transmit the leaf crinkle virus disease of sugar beets in Europe. The bug itself is considered a minor pest of sugar beets, but in areas where it is responsible for transmission of the disease, it has caused losses up to 75 percent of the yield and reduced the sugar content of the roots by as much as 35 percent. Between 1930 and 1935 in Poland the disease spread over 6,400 square miles and reduced the yield 50 percent in some areas. Damage from leaf crinkle to sugar beets on the European Continent is greater than from all other pests and diseases combined. The disease is often compared with curly top in this country although symptoms are not identical.



Crinkle Disease  
Damage to Sugar Beet

Distribution: Occurs throughout Europe including the British Isles, in USSR and Tunisia.



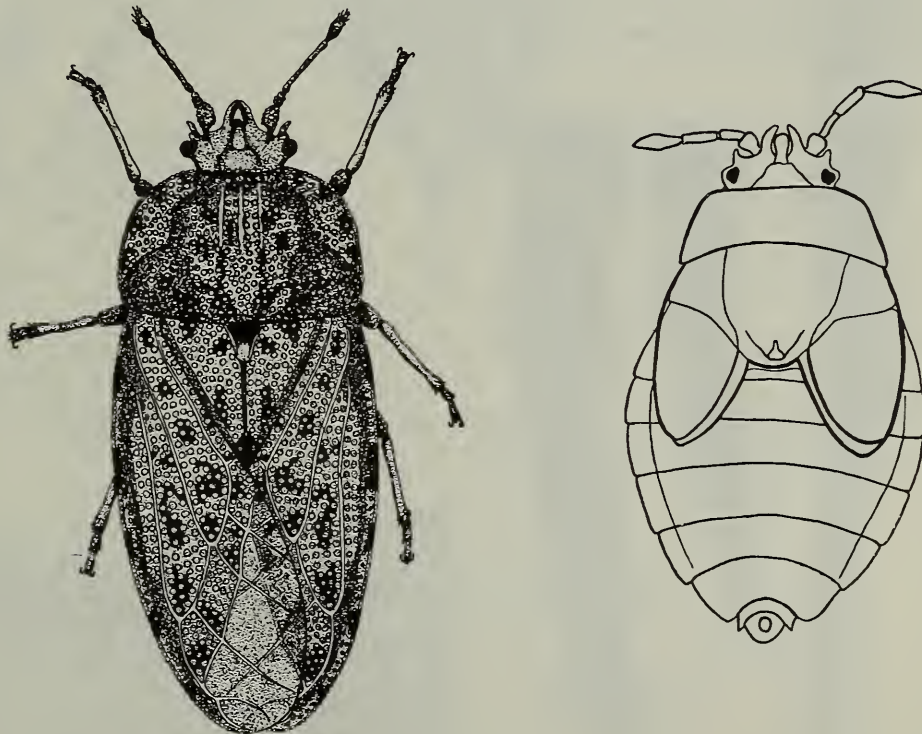
General Distribution of Beet Bug

(Piesmatidae, Hemiptera)

Hosts: Known to feed on many plants, but completes development only on Chenopodiaceae. Cultivated hosts include beets, spinach, mangold and garden sorrel.

Life History and Habits: The overwintering adults emerge from April 15 to May 22 in Poland and migrate to beet fields. When no plants have sprouted, they feed on wild Chenopodiaceae such as goosefoot. The eggs are deposited on underside of the seed leaves or on the stem of the plant; hatching in 2 to 3 weeks. The nymphs pass through 5 molts, total development lasting from 33 to 86 days. Overwintering females deposit eggs until the end of August. Summer-generation adults usually appear the second-half of June and start to enter hibernation around July 1. They overwinter in edges of fields, grass borders and beneath trees and bushes. Generally, there is only one generation a year. The primary symptoms of leaf crinkle disease on beets develop shortly after feeding and consist of light-colored spots. Secondary symptoms develop after a latent period. Leaves become bent and crinkled and turn inwards, often resembling loose lettuce. The veins are prominently white and the leaf is brittle. The entire growth of the plant is retarded or arrested and the sugar content diminished.

Description: The eggs are minute and oblong, averaging 0.64 mm. by 0.27 mm. in size, and honey-yellow in color. Newly hatched nymphs are at first orange-yellow but turn green when mature. Adults are between 3 and 3.5 mm. long and from 1 to 1.5 mm. wide; gray in color with markings on the elytra. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7 (47) 11-22-57



Adult and Fifth-instar Nymph of Piesma quadratum

Figures (except map) from Wille, J. 1929. Die Rubenblattwanze. Monog. zum Pflanzenschutz 116 pp., Berlin.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BEET WEEVIL (Cleonus punctiventris Germ.)

Economic Importance: This weevil is known as a serious pest of sugar beets in central Europe as well as in other parts of its range on occasion. Although beets are attacked in all stages of growth, principally the seedlings suffer the greatest damage. Large acreages of young beets have been destroyed in a very short time and during outbreak periods it is frequently necessary to replant entire fields. For example, in 1928 at Kiev, Russia, 71 to 92 percent of the beets had to be resown.

Distribution: Austria, Bulgaria, Czechslovakia, France, Germany, Hungary, Poland, Rumania, Russia, Turkey, and Yugoslavia.

Hosts: Although primarily a pest of beets, the weevil has been reported from potatoes, corn, spinach, tobacco, oats, alfalfa, Russianthistle, lambsquarter, saltbush, prostrate knotweed and redroot amaranthus.

Life History: The biology as worked out in Rumania is as follows: Adults emerge from hibernation during the latter half of March and feed on plant foliage. Mating occurs from early May to mid-June. Females deposit about 70 to 80 eggs to a depth of one inch in the soil in vicinity of beet plants from late May to late June. After oviposition, the females die, but males continue to feed. Larvae hatch near the end of July, feed on roots of beets and become full-grown at the end of August. Pupation takes place during the autumn.



Beet roots damaged by  
C. punctiventris  
(After Miestinger)

Description: Adult 10-13 mm. long, somewhat attenuate, vestiture of gray and brown scales. Scales three-clefted. Elytra with a rather vague submedian transverse band of dark scales. Punctures of the underside each with a long white hair. (Prepared by Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(8) 2-22-57.



Adult

Curculionidae, Coleoptera

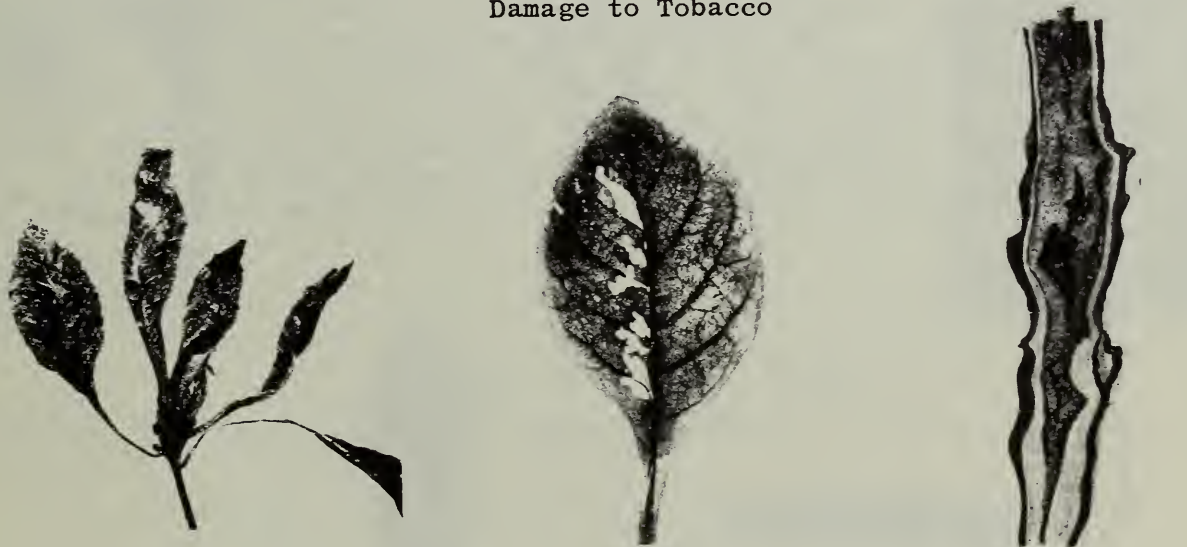
Adult from USDA

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

TOBACCO STEM BORER (Gnorimoschema heliopa (Lower))

Economic Importance: This widely-distributed gelechiid is a major pest of tobacco in Australia, Ceylon and Malaya. Damage occurs chiefly in the stem where the soft tissue is excavated either in a restricted area or through linear tunnels in the pith. Injury may also occur in terminals and leaves of field tobacco, but in seed beds due to the small size of plants, the stems are invariably attacked. The pest is not generally detected in the seed bed until gall formation has appeared on the stems, by which time considerable damage has occurred. Stunting and distortion are common in unprotected seedlings. Field damage may be severe, sometimes involving loss of entire plants; however, damage in the seed beds is generally more serious. In this situation loss of 30 percent or more has been recorded.

Damage to Tobacco



Infested Seedling  
(note swelling)

Mined Leaf

Tunnelled Stalk

Distribution: Nyasaland, Tanganyika, the Rhodesias, Union of South Africa, Greece, Turkey, Israel, India, Ceylon, Malaya, Philippines, Indonesia, Australia, Fiji, New Guinea and Samoa.

General Distribution of Tobacco Stem Borer

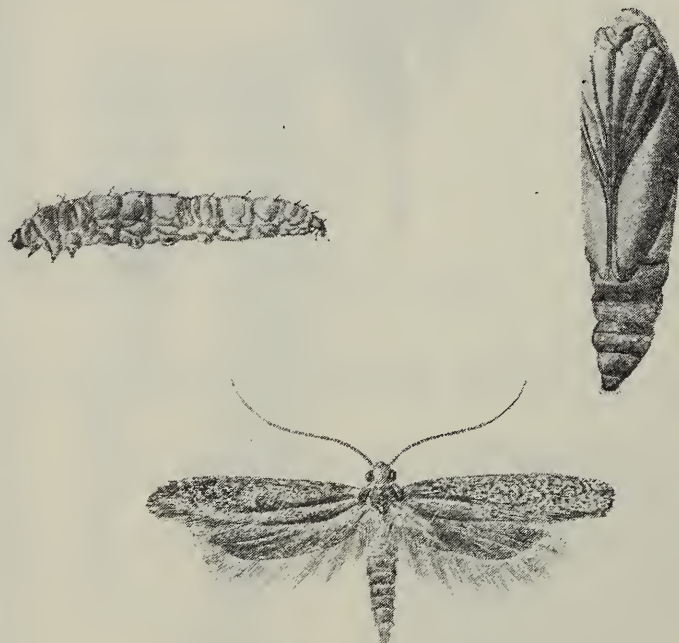




**Hosts:** Cultivated and wild tobacco and eggplant. Wild Solanaceae in some tropical areas have also been reported as hosts.

**Life History and Habits:** Adults are nocturnal. Oviposition begins about 3 to 8 days after emergence and continues for one to two weeks. Each female deposits 200 or more eggs singly on the tobacco leaves. The larvae hatch in 4 to 6 days and feed in leaves or stems for nearly a month, then hollow a chamber in the stem near the epidermis where they spin a cocoon. Studies in Queensland, Australia show that when development occurs in midribs of large leaves no cocoon is formed. After a pupal period of about 10 days, the adult breaks through the lightly sealed exit of the pupal chamber and escapes. Several generations may develop annually but apparently only one is very injurious to tobacco. The adult habits are similar to those of the closely-related potato tuberworm, G. operculella.

**Description:** The reddish-brown adult is small, slightly more than 6.5 mm. in length with about 13 mm. wing expanse. Forewings are mottled with small darker patches. Freshly-emerged adults can easily be separated from G. operculella whose forewings are grayish. The hindwings of G. heliopa are grayish and margins are fringed with relatively long gray cilia. Eggs are creamy white. The newly-hatched larva is approximately 1 mm. in length. There are five larval instars. The pupa, about 7 mm. in length, is light green when first formed but soon darkens to light brown and later becomes almost black. The cocoon is formed either above or below the emergence hole but the head is always directed towards the exit. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)  
CEIR 7(26) 6-28-57



G. heliopa Larva, Pupa and Adult  
(greatly enlarged)

Figure of tobacco seedling from Tobacco Growing in Queensland. Section on Tobacco Pests by J. H. Smith, pp. 77-105, 1933.

Other figures (except map) from Atherton, D. O. 1936. Queensland Agr. Jour. 45(2):131-145.

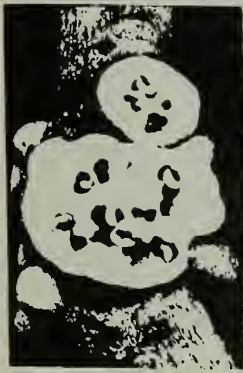
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Gelechiidae, Lepidoptera

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

TURNIP GALL WEEVIL (Ceutorhynchus pleurostigma (Marsham))

Economic Importance: This pest frequently causes considerable losses in crucifers in Europe including the British Isles. Severe infestations were reported in Wales in the mid-thirties. The larvae, which cause the major damage, attack the roots retarding growth and inducing gall formation. In heavy infestations as many as 40 larvae and 5 to 10 galls per cabbage plant have been recorded on 80 to 100 percent of the crop. The leaf-feeding adults cause only slight damage in the spring and fall. C. pleurostigma larvae are frequently intercepted in turnips from Europe at U. S. ports of entry.



Turnip Gall Weevil Damage

Distribution: Occurs throughout most of Europe.



General Distribution of Ceutorhynchus pleurostigma

Curculionidae, Coleoptera

Figures: Adult, adult damage to leaf and larva from Pietri-Tonelli, P. de. 1950. Redia 35:85-128. Larval damage from Frickhinger, H. W. 1955. Leitfaden der Schadlingsbekämpfung. Stuttgart, 505 pp. and from Rostrup. S. and Thomsen, M. 1931. Die Tierischen Schadlinge des Ackerbaues. Berlin, 367 pp.



**Hosts:** Most cultivated crucifers including cauliflower, rutabaga, kale, horse-radish, radish, mustard, turnip, broccoli, brussels sprouts and cabbage. Charlock is a favorite wild food plant.

**Life History and Habits:** Observations at Venice, Italy show life history as follows. Adults emerge from soil at beginning of May, feed on wild and cultivated crucifers and disappear in soil crevices and under debris by end of month. They are not found again on plants until September when they resume feeding, mate and begin laying eggs singly in the collar and underground parts of the stems. Hatching occurs in 5 to 6 days and the larval feeding produces gall formations which are enlarged as growth proceeds. Several galls may be united into one large protuberance. After cessation of activity from December to February, the larvae feed again then leave the galls to pupate in earthen cells about 2 inches below the soil surface. Pupation lasts about 15 days. There is only one generation a year in the Venice area.

**Description:** Egg oval, almost transparent, 0.35 mm. by 0.25 mm. Larvae typically curculionid in form, whitish and when mature about 4 mm. long. Head is small and well-exserted; mouth parts hypognathous. The three thoracic and ten abdominal segments are distinct, the last being minute. There is a lateral row of tubercles on each segment, very pronounced on last segment; none on the prothorax. Few spines over body, most prominent on basal prothorax and lateral tubercles. Pupa is uniformly white and measures 3.7 mm. in length and 2.5 mm. in width. Adult, oblong-ovate, convex. Brownish-black, shiny, above sparsely clothed with yellowish to brown hair-like scales; beneath thickly clothed with tan plumose scales, very dense on mesepimeron. Beak slender, longer than thorax, striate on basal half. Antennae seven segmented with first to fourth segments elongate. Prothorax deeply constricted near apex, disc densely, coarsely punctate, dorsal channel entire, more deeply impressed near apex and base. Elytra striae fine, deep, punctured, each puncture with yellowish plumose scale; intervals wider, flat, rugose, with two-three rows of fine brownish hairs. Femur with small acute tooth, claws with long tooth. Male with large oval impression on last ventral segment. Length 2.5 to 2.7 mm. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7 (43) 10-25-57



Larva and Adult of Ceutorhynchus pleurostigma

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

TURNIP SAWFLY, BEET SAWFLY (Athalia colibri (Christ))

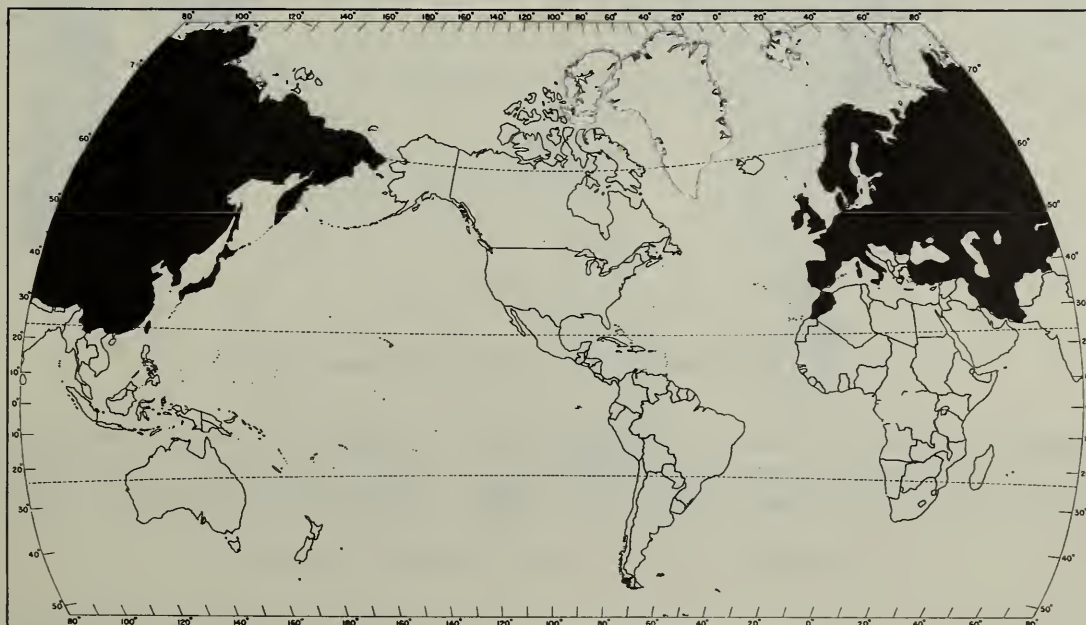
Economic Importance: This sawfly is the most important pest of mustard in U.S.S.R. as well as a serious pest of rape in that country, Switzerland and Poland. It is responsible for severe injury to rape, mustard and flax in Germany and cabbage in Spain. Leaves of radish are frequently destroyed in France and Iran and late rape fields in Switzerland have been devastated within a few days. In addition to widespread damage to crucifers, the pest sometimes causes loss to sugar beet in Europe. Populations intensities of 32 and 42 larvae per plant have been recorded on mustard in Italy and U.S.S.R., respectively. The larva through its feeding perforates and skeletonizes the plant foliage. The second generation, which occurs in the fall, is more serious than the first.



A. colibri Damage to Crucifers

Distribution: Occurs throughout most of Europe, Asiatic part of U.S.S.R., China, Japan, Korea, Formosa, Iran, Turkey and Morocco.

General Distribution of Turnip Sawfly





Hosts: Cultivated and wild crucifers, sugar beet, carrot, flax and grape.

Life History and Habits: There are normally two generations a year in Germany and Italy, but three generations are reported in Switzerland. The first adults appear in May and deposit eggs in incisions in the lower surface of the leaves, up to 4 eggs per leaf. Each female may lay 10 to 23 eggs a day and survive for about 14 days. The eggs hatch in 4 to 7 days in Germany. The newly-hatched larvae feed on lower surface of leaves, but migrate to upper surface as they mature and feed on the edges. Larvae become full-grown in 20 to 25 days. After fifth molt, they spin cocoons in the soil in which they overwinter. Pupation, lasting 4 to 8 days, occurs in the spring. Pupation in the summer generation requires from 15 to 20 days. Either second or third generation overwinters.

Description: The adults are relatively slim, averaging 6 to 8 mm. in length. The males are invariably smaller than the females. The body is usually bright orange, with the brilliant color of the abdomen partly concealed normally by the wings. The head is black with the exception of the mouth parts, which are yellowish. The coloration of the thorax is an important characteristic of the species. The pronotum and areas of the mesothorax are reddish-yellow with a transition to the more yellowish abdomen. The mesonotum is black and the metathorax is largely black. The wings are smoky-yellow brown, especially towards the body. The terminalia are also important taxonomic characters. Newly-deposited eggs are bean-shaped and whitish-yellow, later turning dirty-gray; average 0.42 mm. to 0.84 mm. in length. The larvae are without pubescence, predominantly blue-black in later instars with an especially darkly-marked median dorsal line, which is bordered on either side by a strong black stripe. The ventral surface is generally gray-black. Fifth-instar larvae measure 14 to 16 mm. The cocoon is oval and varies between 7 and 11 mm. The pupal extremities, shortly after molting, are transparent; the thorax gray-yellow and the abdomen gray-green. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(28) 7-12-57.



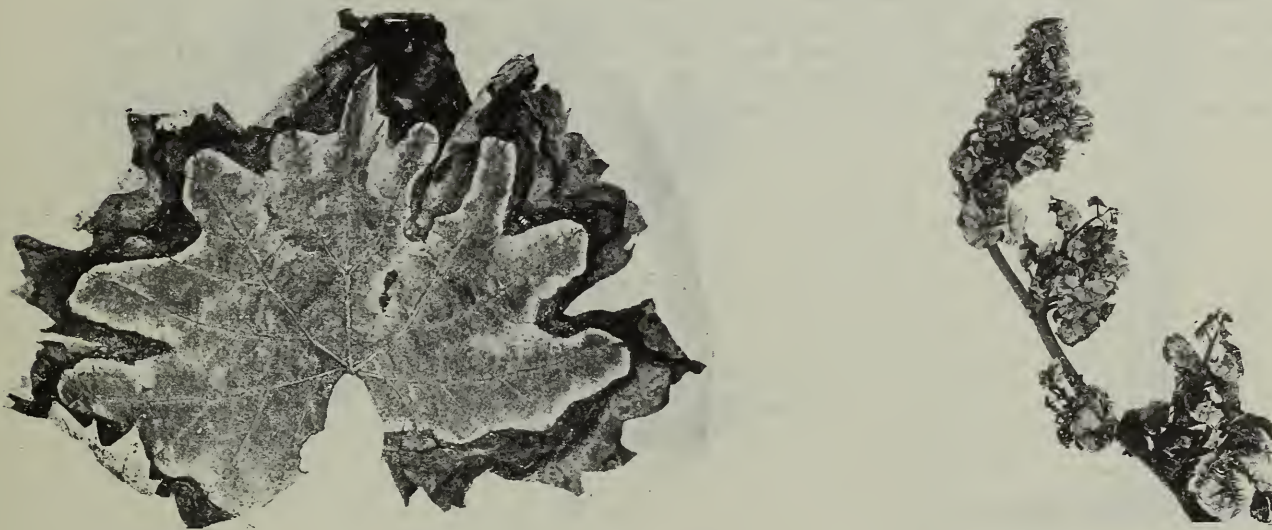
A. colibri Adult and Larval Stages

Figure of damage to mature plants from Martelli, M. 1946. Instit. di Ent. Bol 15: 184-202. Figures of larvae from Riggert, E. 1939. Ztschr. f. Ent. 26(3): 462-516. Figure of adult from Berland, L. 1947. Faune de France 47, 496 pp. Paris.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

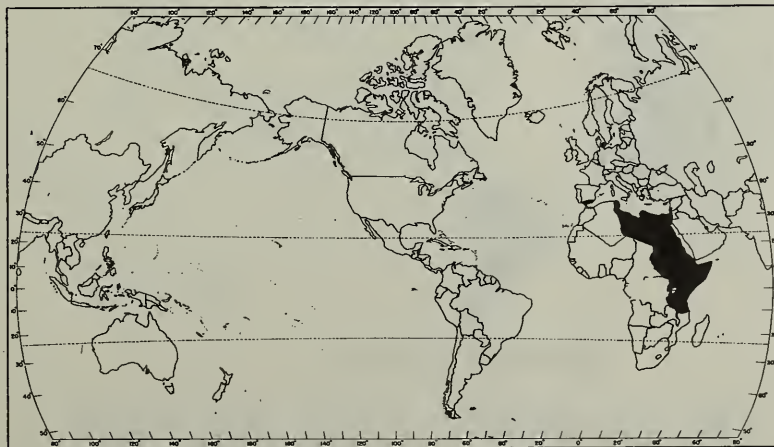
COTTON JASSID\* (Empoasca lybica (Bergevin))

Economic Importance: This leafhopper is one of the most important pests on cotton in the Sudan where it caused as much as 25 percent loss of the crop yearly in areas of the Gezira Province prior to initiation of a control program in 1945. This program, which has involved up to 250,000 acres annually, resulted in an estimated saving of 225,000 bales (400 lbs. per bale) of lint cotton during the period 1945-54. In Israel, E. lybica is responsible for considerable injury to eggplant, tomato, pepper and potato. Damage to young eggplant is sometimes so severe that the plantings are abandoned. Serious injury has also been recorded on grapes, particularly in Spain. Feeding of the leafhopper produces "hopperburn" or discoloration, curling, and drying of the foliage. This leads to stunting and premature shedding of buds and fruit or death of plants.



Empoasca lybica Damage to Grape

Distribution: Wide range in Africa, from Mediterranean as far south as Tanganyika; also Israel and Spain.



General Distribution of Cotton Jassid

\* Also called green leafhopper (Cicadellidae, Hemiptera)



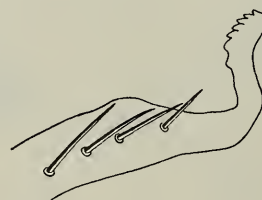
**Hosts:** Feeds on many plants; among more important are cotton, potato, tomato, eggplant, okra, grapes and beans.

**Life History and Habits:** Under conditions in Sudan, adults migrate to small cotton seedlings in August and populations reach peak by end of November then decrease. Beginning in January the insects are found on eggplant and then on other garden plants and weeds where they slowly breed until return to cotton in August. Eggs are deposited in leaf tissue, especially on underside along the main vein. Egg and nymphal periods last about 8 days each in summer but adults may live for as long as two months. There may be several generations a year, depending on climatical conditions; cold dry weather retards development.

**Description:** Adults - male 2.7 mm., female 3 mm. in length. Wings light green or golden yellow, one third longer than abdomen. Vertex regularly rounded at apex, ornamented with 3 inconspicuous whitish lines; pronotum unicolored transparent, greenish. Head and pronotum approximately equal in width. Scutellum with 2 semi-callose whitish lines, not very prominent. Body light green without black stripes or spots. Tarsal claws dark brown to black. Nymphs are whitish at first but soon become concolorous green or yellowish-green. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7 (45) 11-8-57



Adult



Genitalia

Empoasca lybica

Figures (except map): Adult and damage to grape from Ruiz Castro, A. 1950. Bol. de Patol. Vegetal y Ent. Agr. 17:111-162. Genitalia and damage to leaf from Ruiz Castro, A. 1944. Fauna Ent. de la Vid en Espana. II. (Hemiptera). 189 pp. Madrid.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

COTTON PLANT BUG (Horcias nobilellus (Berg))

Economic Importance: This pest has caused serious injury to cotton over a wide area of Sao Paulo, Brazil since 1936. Destruction of as much as 40 percent of the crop has been reported and the increase of mirids, especially H. nobilellus, in recent years has raised losses from insects on untreated cotton from 40 to 70 percent. Losses from H. nobilellus in Sao Paulo in 1941-42 were estimated at around \$2,000,000. Infestations cause excessive shedding of squares and small bolls and reduction of lateral branches. It is said that this species is more destructive to cotton than the cotton fleahopper.

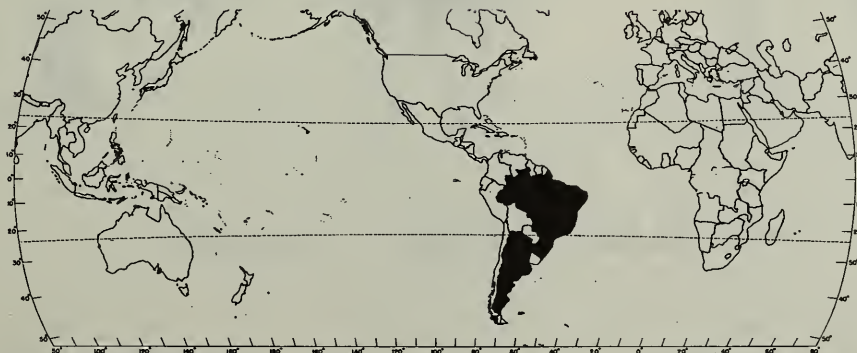


Damaged Cotton Bolls



Plant Defoliated to Show Abnormal Growth and Loss of Bolls

Distribution: Brazil, Argentina.



General Distribution of Horcias nobilellus

Miridae, Hemiptera

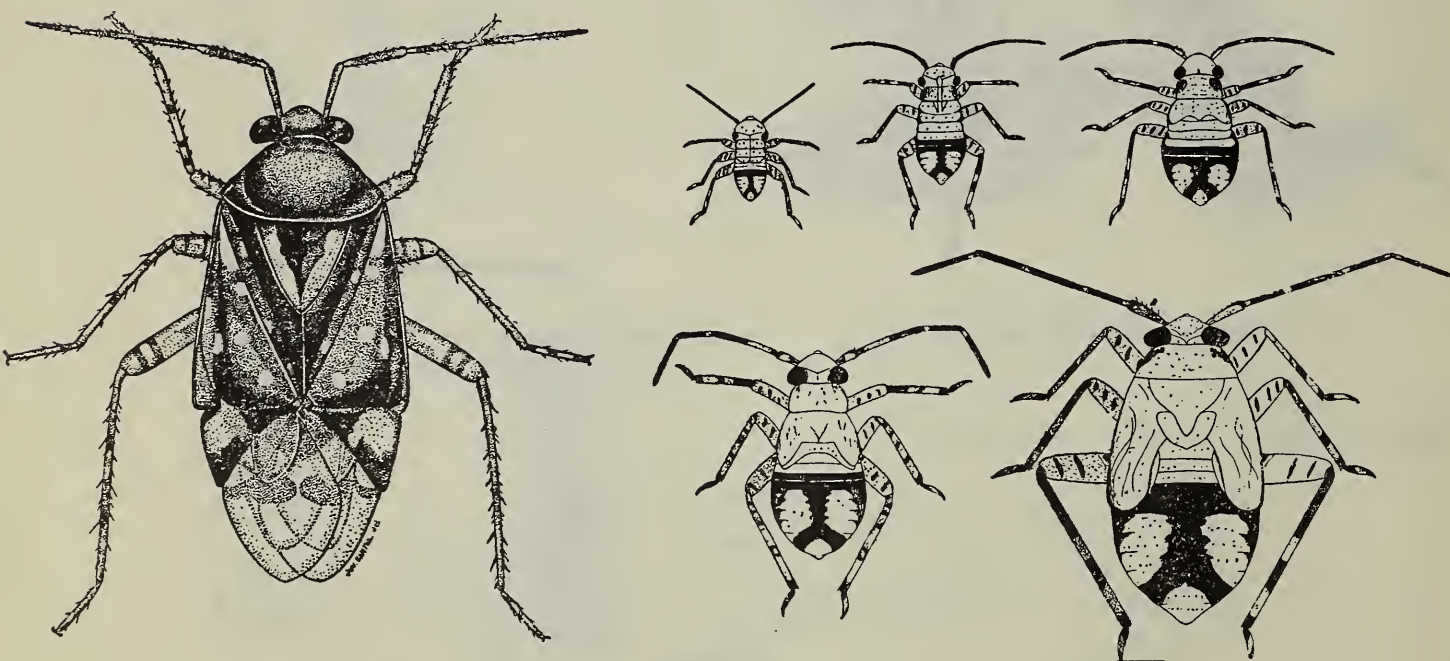


Hosts: Feeds on many plants but prefers cotton and other Malvaceae.

Life History and Habits: Reproduction is continuous throughout the summer with no distinct generations. The insect overwinters in the egg stage. Adults live from 15 to 30 days. Eggs are deposited in tender plant tissues in punctures made by the ovipositor. As many as 130 eggs may be laid by a single female over a period of 20 days. The eggs hatch in about 12 days and nymphs, passing through 5 instars, develop in about 15 days. An average life cycle involves around 27 days. Infestations increase in intensity during the season resulting in late-planted cotton being more seriously attacked. Dispersal of populations is accomplished through flight. Nymphs and adults are active feeders on terminals, squares, blossoms and immature bolls.

Description: Adult brilliant colored, 5 mm. by 2 mm. or about the size of the tarnished plant bug. Eyes red. Front of head, thorax and part of the corium ochreous. Remainder of hemelytra mostly brownish-red. Scutellum varies from pale to brilliant yellow with central part brownish-red. Ventral surface pale yellow or ochreous with irregular reddish spots. Nymph has light tan head with red, prominent eyes. Prothorax greenish yellow, mesothorax dark red or brown, metathorax yellowish-brown. Ventral surface of thorax greenish. First and second abdominal segments greenish, third and fourth reddish with reddish dorsal line extending posteriorly and widening into an inverted "Y". (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)

CEIR 7(42) 10-18-57



Adult and Nymphs of Horcias nobilellus

Figures of damage from Hambleton, E. J. 1938. Inst. Biologico Arq. 9(9): 85-96.

Figures of insect from Sauer, H. F. G. 1942. Inst. Biologico Arq. 13(6):29-66.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

SPINY BOLLWORM (Earias insulana (Bdv.))

Economic Importance: Wherever spiny bollworm occurs, it is one of the most serious pests of cotton. Along with the related phalaenid, E. fabia, it is considered the worst pest of cotton in India. Observations in that country show that 8-60 percent of the crop may be damaged through attack on the tender stems of young plants and when the cotton reaches the fruiting stage infestations range up to 75 percent. Infestations of 83 percent have been observed in northern Sudan. During 1952 it was reported that E. insulana destroyed over 90 percent of the cotton crop in Israel and from 40-80 percent of untreated cotton in Baghdad area of Iraq. Cotton growing in southwestern Iran is impractical without control of this pest and late cotton is often severely injured in Spain.

Damage to Cotton by Spiny Bollworm



Distribution: Africa, Madagascar, Mauritius, Spain, Sicily, Iran, Israel, Iraq, Turkey, Syria, Cyprus, India, Pakistan, Malaya, Thailand, Australia.

Hosts: Attacks many malvaceous plants including cotton, abutilon, okra, hollyhock, hibiscus, mallow, sida and thespesia. Has been reported also on ceiba, carob and kerria.

Life History and Habits: Under conditions of southern India the life history is as follows: Eggs are laid only at night on shoots, stalks, flower buds and bolls. They hatch in 4-7 days. The larvae enter plant parts and feed for 9-16 days, moving from one to another. Pupation occurs in cocoons below surface of the soil and lasts 8-14 days or it may take place on the cotton plant or in surface debris. Adults live 8-22 days and oviposit principally during the first week, laying about 400 eggs. Studies in this region show that the moths are not attracted to bright lights or certain chemical attractants. Breeding is continuous in Egypt and India, wild malvaceous plants serving as hosts. This widely-distributed species is found under severe and diverse climatic conditions.

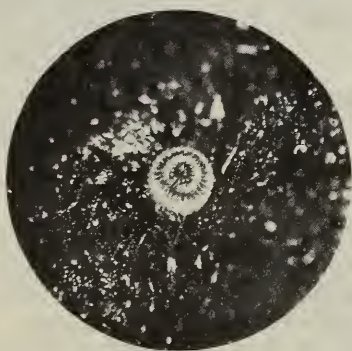
Phalaenidae, Lepidoptera



Description: *E. insulana* moth has wing expanse of about 25 mm. Color of fore-wing varies but is commonly grass green. Hindwing is white. The egg is spherical, about 0.5 mm. in diameter, bluish-green with parallel longitudinal ridges which project upwards. The newly-hatched caterpillar is brownish-white with a dark head and prothoracic shield and is about 1.3 mm. in length. Around the fifth day of development, orange yellow tubercles are prominent on the second and third thoracic and first abdominal segments. A full-grown larva, measuring about 15-18 mm., is greenish-white with black marks all over the body and with orange dots on the prothorax. The pupa is purplish brown. There is a distinct median ridge on the thorax and several prominent points on the fifth abdominal segment. The pupa is enclosed in a tough silken cocoon of dirty white to light brown color. (Prepared in Plant Pest Survey Section in Cooperation with other ARS agencies). CEIR 7(16) 4-19-57.



Adults (showing variation)



Egg



Larvae

Photographs of *E. insulana* egg and larvae and damaged cotton bolls from Trabajos (Serie Fitopatología) No. 152 by S. Planes, 1946, Madrid, 10 pp. Adults - USDA photograph. Photograph of damaged cotton plant from Spotted Bollworms in So. Gunarat by Ind. Cent. Cotton Comm., 1935, Bombay, 24 pp.

INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

NUN MOTHS (Lymantria monacha L.)

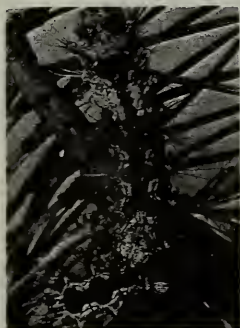
Economic Importance: The nun moth is a major pest of coniferous and deciduous trees. It is understood that its damage often parallels or exceeds that of the gypsy moth in areas where both occur. Severe attacks occurred in forests of Czechoslovakia in the early 1920's although infestations were not as serious in Belgium and France during the same period. The serious outbreaks in Czechoslovakia entirely defoliated 262,000 acres and caused an estimated loss of 1 1/2 million pounds sterling over an area of 1,400,000 acres of infested forest. In addition to forest damage, complete defoliation of apples and pears was recorded in that country in 1922. Outbreaks of this lymantriid generally occur at intervals of 7 to 10 years in Czechoslovakia and last for 5 to 7 while in Germany outbreaks normally last 3 to 4 years and are usually checked by a virus disease.

Distribution: Spread throughout the central area of Europe extending to Spain in the south, Britain in the west and Sweden and Finland in the north. On the east the species extends through Russia proper into Siberia. In Asia it is recorded from Turkey, Japan, Korea, Tibet and sections of China.

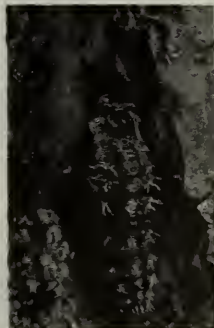
Hosts: Hosts include fir, maple, alder, birch, European hornbeam, hazelnut, beech, ash, larch, apple, spruce, pine, poplar, European aspen, plum, cherry, pear, oak, buckthorn, willow, mountainash, linden, elm and European whortleberry.

Life History and Habits: In East Prussia (West European Russia) hatching takes place in early May and feeding continues during the summer. Larval development varies from 51 to 66 days with prepupal stage lasting from 1 to 5 days. Pupation normally occurs on branches or trunks near feeding sites in late June and early July and last from 12.5 to 23.5 days. Male moths emerge about one day earlier than females. Emergence occurs between July 12 and August 4 and adults are active for 24 to 36 days. Egg batches are deposited on tree trunks and branches. The insect overwinters in this stage. There is one generation a year. Data from Czechoslovakia show that L. monacha slowly increases in population with light rainfall and decreases with heavy rains. In that country infestations do not occur at altitudes above 3,300 feet.

Description: Adult: Forewings white with strong notched black lines; hind wings grayish white; fringe flecked with black; abdomen reddish with black bands (see illustrations). Male-wing expanse 40 mm., female-wing expanse 55mm. Larva: Brown with six blue and red warts on dorsum; on second segment a black, blue and white spot; three last segments flecked with black; 20-25 mm. long. The species is quite variable in color. (Prepared by Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7 (12) 3-22-57.



Larva



Pupa



Adult

Figures from Gabler, H. 1955. Forstschutz gegen Tiere. Berlin 368 pp.

Lymantriidae, Lepidoptera



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

PINE LAPPET (Dendrolimus pini L.)

Economic Importance: Outbreaks of this moth occur periodically in Europe causing severe defoliation to pine, its primary host. Serious buildups take place about every six years in Poland. The outbreak of 1938 on Lussin Island in the northern Adriatic caused complete defoliation of 60,000 trees. Damage was also severe at this time in Elbe Valley in Bohemia, Germany. Many thousand acres were treated in Germany in 1948, 1949 and 1950 for control of this pest. In heavy infestations complete destruction of foliage may occur within a period of a few days. Successive defoliations or defoliations followed by drought often cause death of the trees.



Defoliation of Pine



Cocoons on Host

Distribution: Spain, France, Netherlands, Germany, Austria, Norway, Finland, Italy, Sweden, Poland, U.S.S.R., Switzerland, Bulgaria, Greece, Czechoslovakia, China, Korea, Japan and Morocco.



General Distribution of Dendrolimus pini

Hosts: Pine, Atlas cedar and larch, with pine being the most important host.

Life History and Habits: Moth flights occur from late May to August with the mass flights in the middle of July. There is normally only one generation a year but some larvae may overwinter twice. Females deposit from 200 to 300 eggs in batches of 20 to 150 on pine needles, thin twigs and in other locations, especially when moths are abundant. Larvae hatch in 1 to 5 weeks, depending on area, and begin feeding on the needles. There are usually 5 instars in Italy and the larval period lasts from 50 - 70 days. Observations near Potsdam, Germany, indicate the larvae feed regularly, night or day, within temperature range of 42 to 75° F. The larvae may crawl for comparatively long distances. In Bohemia they hibernate in the ground under moss and are not affected by temperatures as low as -22° F. On Lussin Island they overwinter on the trees. The larvae emerge from hibernation over a period of about two weeks in the early spring and pupation occurs in early summer. The pupal stage lasts from 20 to 30 days, generally.

Description: Adult female expanse is 70 to 80 mm. with male 50 to 60 mm. Coloring is greatly variable. Forewing is mostly reddish-gray with a gray, yellow or red-brown sinuous crossband and a crescent-shaped white spot. Hindwing is reddish-gray to red-brown. Male generally darker than female and has pectinate antennae. The elliptical eggs are blue-green at first, later turning gray-brown. Ground color of larva is varied: black-brown, brown, yellow, gray or white with heavy pubescence. Two velvety steel-blue vertical stripes are on middle of second- and third-thoracic segments and a light saddle spot on fourth and fifth abdominal segments are typical of the species. Black, white and brown markings are drawn along the body. Larvae overwintering the first time average 26 to 30 mm. in length while those passing through a second winter measure 50 to 80 mm. Pupation takes place in spindle-shaped, dirty gray-white to yellowish-brown cocoons.

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)

CEIR 7 (39) 9-27-57



Female



Male



Larva



Eggs

Figures of larva and eggs, from Melis, A. 1940. Redia 26: 73-175, 23 plates. Adults - USDA photograph.



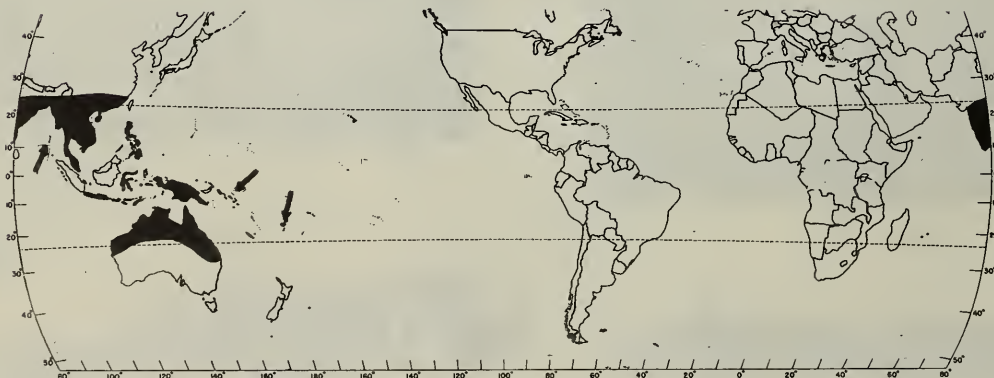
INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

BUFFALO FLY (Siphona exigua (De Meijere))

Economic Importance: This muscid causes serious damage to cattle in areas of the Oriental region, South Seas and Australia by its constant irritation and annoyance. Greatest damage is largely restricted to areas of 20 inches annual rainfall. The pest has often been compared with the horn fly (Siphona irritans) in North America relative to its potential damage in reducing weight and milk production when infestations are severe. Apparently animals suffer most when attacked for the first time. Cattle from infested areas can be readily recognized by the large raw areas around the eyes and on the body that are formed from scratching and rubbing of the animal. Such wounds are attractive to the injurious bush fly (Musca sorbens)\* in Australia. As a rule, populations of up to 1000 per animal are usually tolerated without much injury, although two or three thousand per animal is considered a serious infestation. In the Indo-Malayan Archipelago, surra disease (Trypanosoma evansi) and anthrax are considered to be transmitted by this species.



Buffalo Fly Sores on a Cow



General Distribution of Buffalo Fly

\*Also known as Musca vetustissima

Distribution: Generally distributed throughout the Oriental region, being recorded in China, Indochina, Malaya, India, Indonesia (Java, Celebes and the lesser Sundra Islands), Philippines, Australia, New Guinea, Andaman Islands, Guadalcanal, Russell Islands, Fiji, Solomon Islands and Micronesia.

Hosts: Attacks cattle and buffalo usually, but frequently will attack horses, mules and donkeys. Man, sheep, hogs and dogs are attacked when they are associated with preferred hosts.

Life History and Habits: Adults of both sexes are blood-suckers, living only where bovine hosts occur. Feeding and breeding habits are very similar to Siphona irritans. When feeding, the adult crawls within the hair and thrusts its head to the skin surface so that its body is at an angle. When at rest the wings are held at an angle from the body except when conditions are cool, then they are held flat along the back in scissors-fashion. The fly is almost entirely ectoparasitic, in that it rarely leaves the host, except to oviposit, transfer to another host, or following a disturbance. Adults are found in greatest numbers around the withers and shoulders and on the flanks. Bulls are usually most heavily infested. The female deposits up to 20 eggs in fresh dung. Under favorable conditions eggs hatch in 18 to 24 hours. The larva completes growth in 3 to 5 days under summer conditions with optimum moisture content in dung being about 68 percent. Pupation takes place in the bottom layers of the dung and lasts about 3 to 5 days, thus under normal conditions the life cycle requires from 7 to 11 days. The winter cycle is prolonged to 46 days or more, therefore maximum populations occur during late summer and early autumn, immediately following the summer rains.

Description: Adult is small, measuring 3.5 to 4 mm. The face is silvery-gray, proboscis dark and porrect; the palpi yellowish, stout, uniformly broad, and as long as the proboscis. Thorax is silver-gray medianly, darker laterally, with two well-defined dark stripes. The abdomen is brownish with a median longitudinal stripe, less conspicuous toward the apex. The legs usually yellowish. The wing veins R 4+5 and M 1 curve gently towards one another near the wing margin. Egg is somewhat sausage-shaped, creamy to brownish and about 1 mm. in length. Larva is typical of Diptera and measures up to 10 mm., usually 6 mm., when fully grown. Puparium is typically hard, barrel-shaped, brown, and about 3 mm. in length.

(Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.)  
CEIR 7 (49) 12/6/57



Larva and Adult of Siphona exigua

Figures (except map) from Roberts, F. H. S. 1952. Insects Affecting Livestock. 267 pp. Sydney.



INSECTS NOT KNOWN TO OCCUR IN THE UNITED STATES

HUMAN BOT FLY (*Dermatobia hominis* (L., Jr.))

Economic Importance: In tropical America, this cuterebrid causes serious losses to livestock and often infests man. Dogs and cattle frequently so heavily attacked that death results. The wounds produced by the larvae developing in pickets in the skin are subject to screw-worm infestation. Case histories in man show that some patients suffer loss of energy and require more sleep. The malodorous discharges from the dermal swellings may be more troublesome than the pain. Infection of the wounds, particularly those containing dead larvae, can result in serious crippling effects. In heavily infested forest areas of Sao Paulo, Brazil, examinations have revealed infestation percentages as follows: cattle 100, man 44, mules 17, pigs 12, horses 9, donkeys 5.

Distribution: Argentina, Brazil, British Guiana, British Honduras, Canal Zone, Chile, Colombia, Costa Rica, Dutch Guiana, Ecuador, French Guiana, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad, Venezuela.

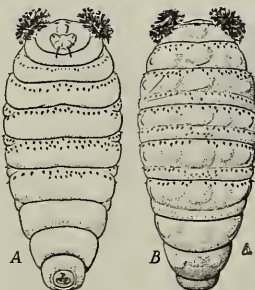
Hosts: Man, cattle, dogs, pigs, horses, mules, monkeys and a number of other mammals, both wild and domestic. Birds are also reported as hosts.

Life History and Habits: The female, which has an unusual system for transporting its eggs, glues them to other Diptera that it has captured. The number of eggs deposited is apparently gaged by the carrier's strength to transport them. Day-flying mosquitoes such as *Psorophora* spp., stable flies, house flies and other dipterous insects that frequent the hosts of *D. hominis* are selected. On rare occasions ticks have been used. Adults may oviposit on foliage if no carrier is available. The larva emerges in 5 to 15 days when it leaves the egg while the carrier is in contact with the host. Entrance to the skin may be gained through a puncture made by the carrier, a hair follicle or a place where clothing, bedding or the ground may contact the moist skin. The larva generally has 3 instars and develops in 5 to 10 weeks but may take as long as 3 months. Each larva makes a separate lesion which develops into a boil-like pocket, opening to the outside. Pupation occurs in the ground and lasts 22 to 24 days. *D. hominis* occurs primarily in wooded tracts, forest margins of lowlands and river valleys but may be found at altitudes of 3,000 feet.

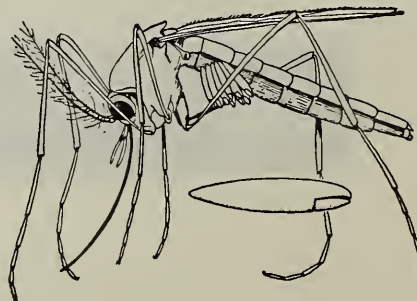
Description: Adults about 12 mm. long, robust, slightly resembling a bluebottle fly. Head mainly yellow; thorax, somewhat dull bluish-gray; abdomen, metallic blue. The arista pectinate; face deeply depressed; proboscis in a deep furrow on ventral side of head, short and cylindrical. Wings and squamae pale brownish and legs mostly yellow. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies). CEIR 7(18) 5-3-57



Adult Female (enlarged)



Larva (enlarged)  
(A) Ventral, (B) Dorsal



Mosquito Carrying  
*D. hominis* Eggs

A MITE NOT KNOWN TO OCCUR IN THE UNITED STATES

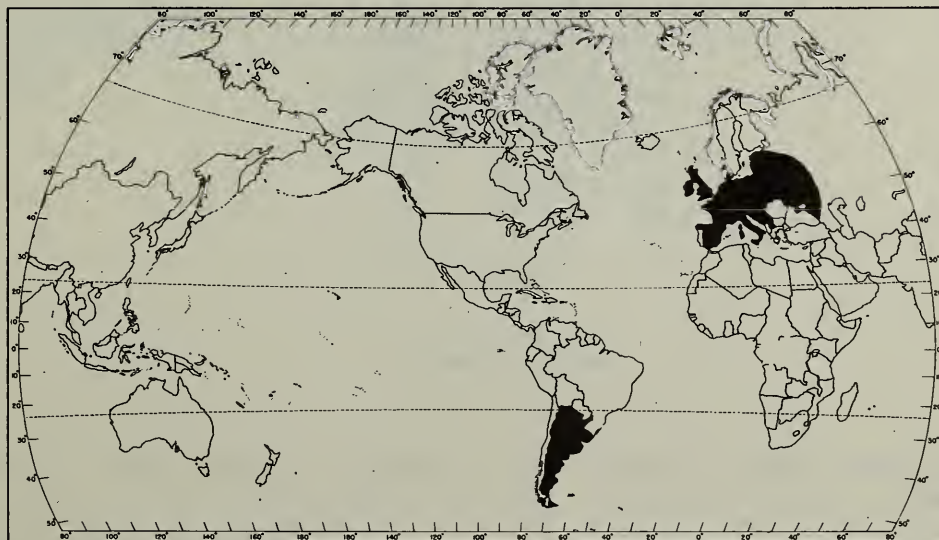
BEE MITE (Acarapis woodi Rennie)

Economic Importance: Acarine disease of adult honey bees was found to be caused by this scutacarid mite in England in 1920 and was called at that time "Isle of Wight Disease." It causes heavy losses of bees in various countries in Europe. Immediately preceding and following World War I, the disease practically decimated bees in England, and during World War II because of the disruption in the bee inspection service, it greatly increased and has continued to spread in Europe since that time. An infested colony steadily declines until it become unproductive or dies. Drones, workers, and queens may be attacked. If introduced into North America, the causative mite would be a particular menace because of the large number of colonies used for pollination purposes. In 1922, Congress invoked legislation known as the Honeybee Act that prohibits the importation of adult honey bees from all countries except countries found free of the mite and excepting bees imported by the U. S. Department of Agriculture for experimental or scientific purposes. The only country so far excepted is Canada.



Discolored Trachea from Infested Bee

Distribution: Acarine disease has been reported from many countries in Europe, and on the British Isles. It also occurs in Argentina, Uruguay and India.



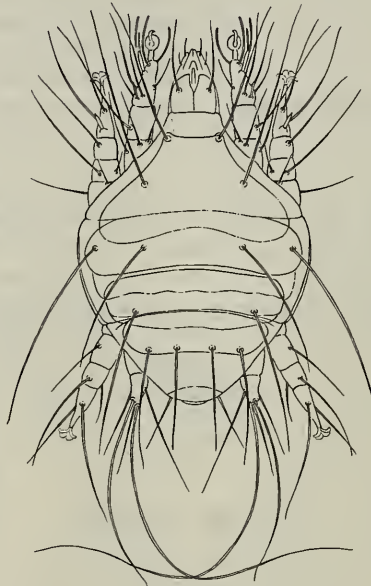
General Distribution of Acarapis woodi



Hosts: Only known hosts are Apis mellifera and A. indica.

Life History and Habits: The species has been divided into two subspecies, A. woodi woodi living within the tracheae and on the wing bases, and A. woodi externus living externally on the ventral side of the neck. No apparent injury is caused by A. w. externus. There are egg, larval, resting, and adult stages, but no 8-legged nymphal stage. The mites enter the anterior thoracic tracheae through the first pair of spiracles. They may spend their entire life within the tracheae puncturing the tracheal walls in feeding and causing them to turn brown or black. The tracheae of healthy bees are white. Entry into the tracheae takes place only in bees 8 to 9 days old or younger. Damage to the wing muscles is caused by the activity of the mites. On older bees the A. woodi woodi form attaches to the base of the wings, producing injury. When the bees die, the mite seeks a new host since it cannot long survive otherwise. The disease is transmitted by drifting of infested workers and by robber bees.

Description: The adult's body is divided into propodosoma and hysterosoma, and the hysterosoma is divided into sections by transverse sutures; the dorsal surface bearing long setae. The mites from bees may be easily recognized in that tarsi IV of the female have no claws or empodia, ending only in long whiplike setae; tarsi II and III have claws and membranous pulvilli; tarsi I have clawlike empodia but no claws. The larval stage is usually egg-shaped and elongated. The egg is unusually large measuring 110 to 128 microns in length and 54 to 67 microns in width. The adult female is 123 to 180 microns by 76 to 100 microns. Male is 96 to 102 by 62 microns. (Prepared in Plant Pest Survey Section in cooperation with other ARS agencies.) CEIR 7(36) 9-6-57



Adult Female

Figure of mite after Hirst, S. 1921. Ann. and Mag. of Nat. Hist. 8(42, 9th series):509-516.

Figure of acarine disease from Burnside, C. E. and Sturtevant, A. P. 1936. U. S. Dept. Agr. Cir. 392, 34 pp. (Photograph by Rennie).

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